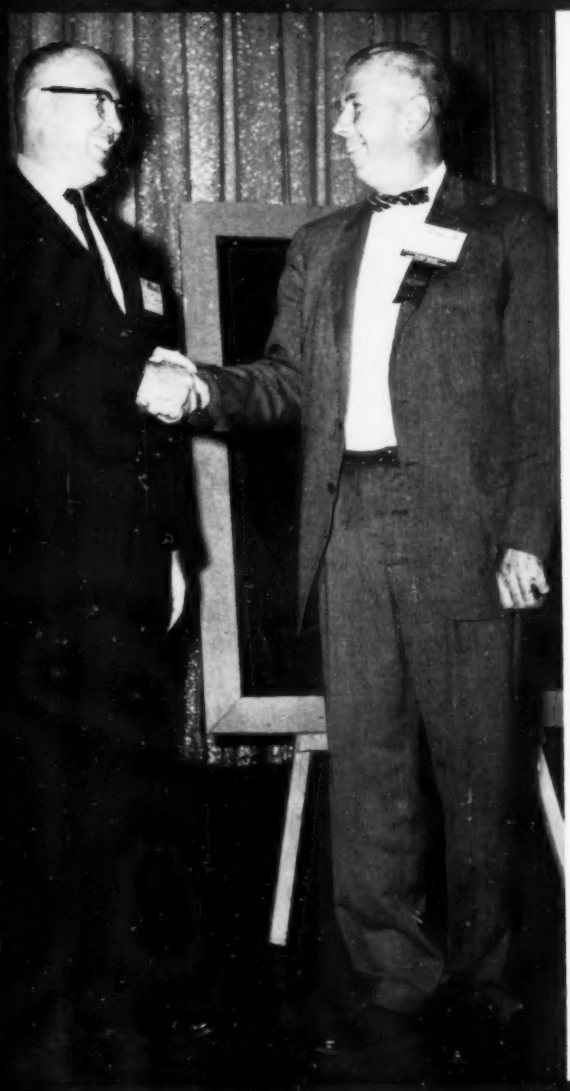
PEST CONTROL

NOVEMBER 1961



Is it more economical to own your office building? . . . . . Pg. 9

Record 650 at NPCA Convention in Miami Beach last month elect Houghton, Adams . . . . . Pg. 12

Bedbugs, fleas, lice, ticks, and parasitic mites in Lesson 11 of Purdue Course . . . . . Pg. 27

Shortcomings in Florida termite control practices . . . . . Pg. 42

New Federal PC board set . Pg. 48

Secretary-treasurer Paul K. Adams (left) exchanges congratulations with new NPCA president Charles W. Houghton after their election to these top industry posts in October.

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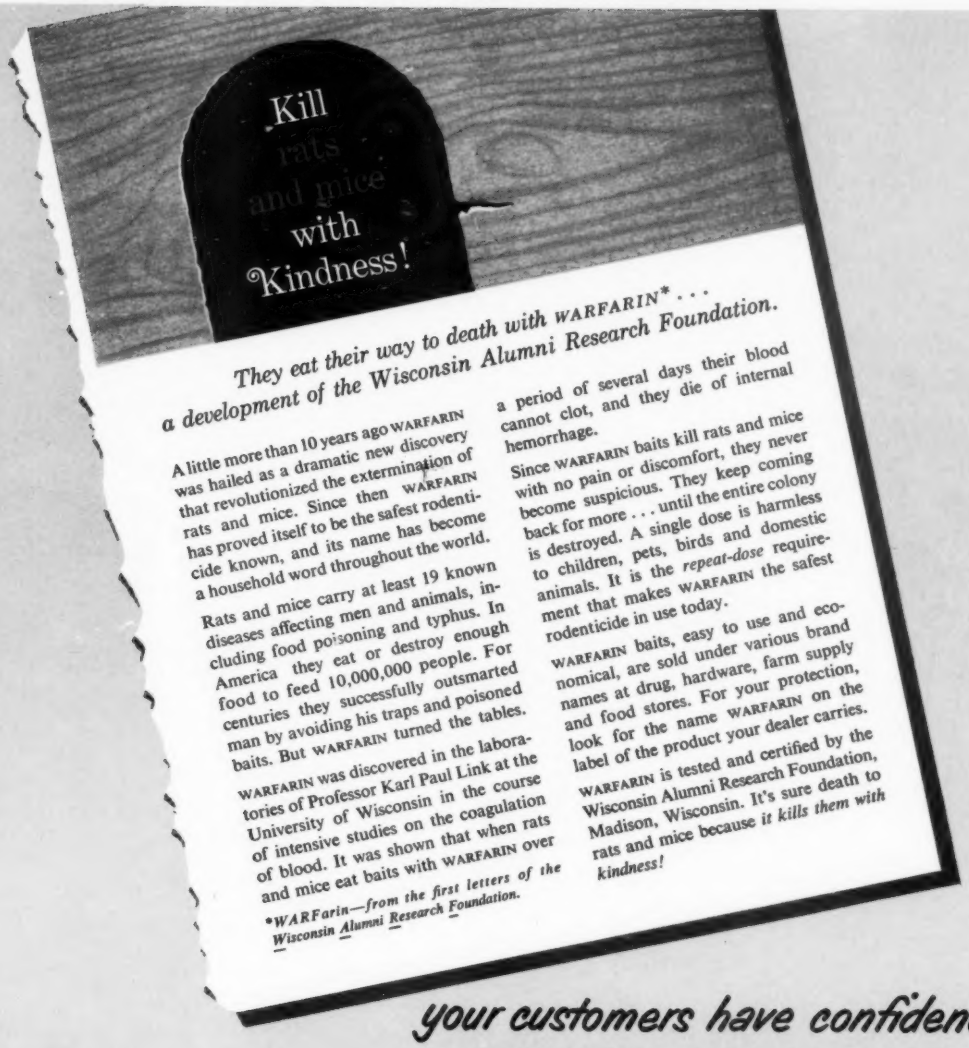

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PEST CONTROL

November, 1961 — No. 11 Volume 29

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Should PCOs Become Policemen?

Several reports have come to us in recent months of once-rejected contaminated foodstuffs being passed off on another unsuspecting, or less particular, customer.

A boxcar of flour, in one instance, was found to be weevily and unacceptable to a large midwestern baker. With a virtual shrug of the shoulder, doors on the railcar were closed by a representative of the shipper who had it moved on to another, smaller baking firm, not engaged in interstate commerce, who bought the flour not knowing it was contaminated.

A southwestern PCO told us about losing a job when his large restaurant customer ignored requests to clean up a food-littered basement floor, and yet complained because roaches could not be kept from invading the street-level dining room. A cellar crumb-making machine was overrun with roaches.

Both of these places, the one which originally shipped the buggy flour and the large restaurant, are in municipalities which have regular food department inspectors paid to spot unsanitary conditions and to levy fines when their orders to clean up are not followed. Neither case reportedly involves interstate traffic so federal agents could not become involved unless requested to take action.

The flour shipper has pest control service but has been unwilling to pay for thoroughly adequate control of cereal pests and won't take the necessary sanitation measures.

The question some industrymen are asking — as they lose contracts and see such flagrant defiance of cleanliness in food commerce — is: Should PCOs act as informers to federal authorities? Should PCOs become policemen, perhaps by law, and let their customers know that if filthy, pest-breeding conditions are not eliminated, PCOs have no choice but to see that the authorities are advised?

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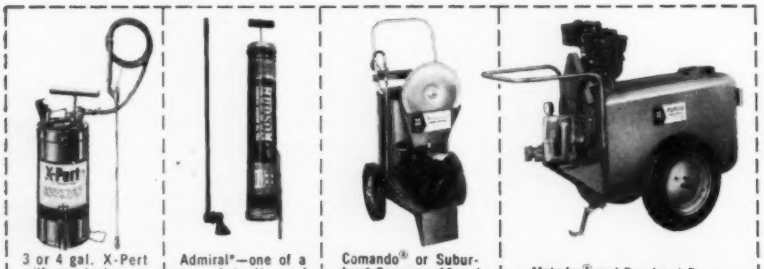

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Letters

"Call A 'Pro'"

I am sending you a copy of a booklet just prepared and distributed by our Division of Food and Sanitation. In common with many health departments, our policy is to advise against the use of pest control poisons by food preparation personnel. This is supported by page 14 of the booklet. It was thought this might be of interest to illustrate the need for cooperation between licensed PCOs and local health agencies.

Dr. J. M. Glenroy

Director
Food Control and Sanitation
Department of Public Health
465 Bay Street
Toronto, Canada

The pamphlet Dr. Glenroy sent is a clever, 16-page booklet done in verse and, pictures, entitled "Pictures Point the Way to Proper Food Handling." On the page 14, referred to in his letter above, is a picture of a PCO applying a pesticide and beneath is the caption, "If roaches have you on the go — Don't take chances, call a 'Pro.'" Single copies of the booklet can probably be obtained by writing Dr. Glenroy at the address given above. Editor.

Count Ants' Teeth

In Lesson 7 on Ants and Related Pests, of your Correspondence Course, comparisons are made between the Argentine Ant and the Brown Odorous House Ant. Identification between the two can also be made by counting the teeth in their mandibles. An Argentine Ant never has less than 17 teeth, while a Brown Odorous House Ant has never more than 14 teeth.

Because of the spread of Argentine Ants in Australia, a local government act makes it obligatory for householders to destroy all such ants on their premises. When an order is issued, treatment has to be carried out within 21 days, so our identifications better be unquestionable!

Felix Kerpen

Pest Exterminator
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Pest Control welcomes expressions of opinions from its readers. Send ideas and comments briefly as possible to James A. Nelson, Editor, Pest Control, 1900 Euclid Ave. Cleveland 15, Ohio.

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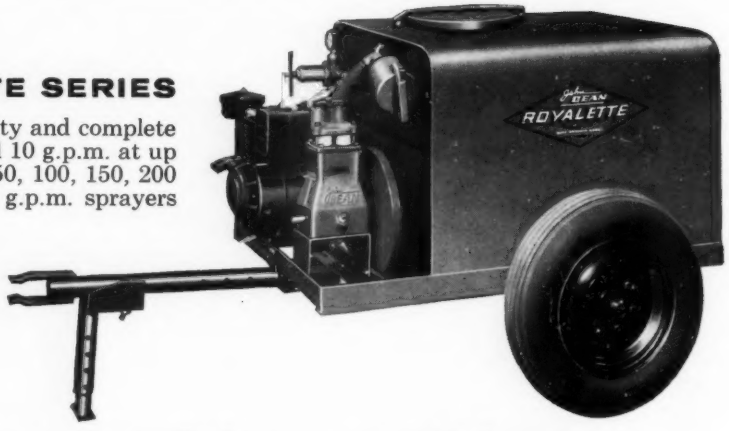

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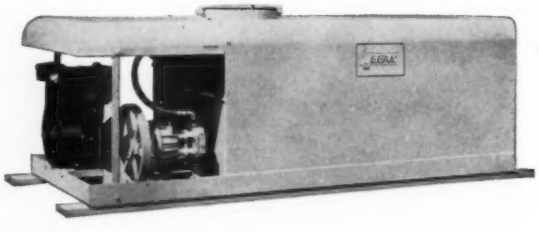

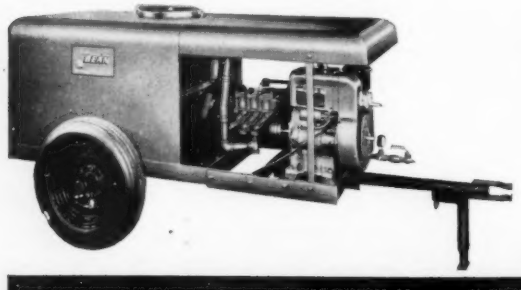

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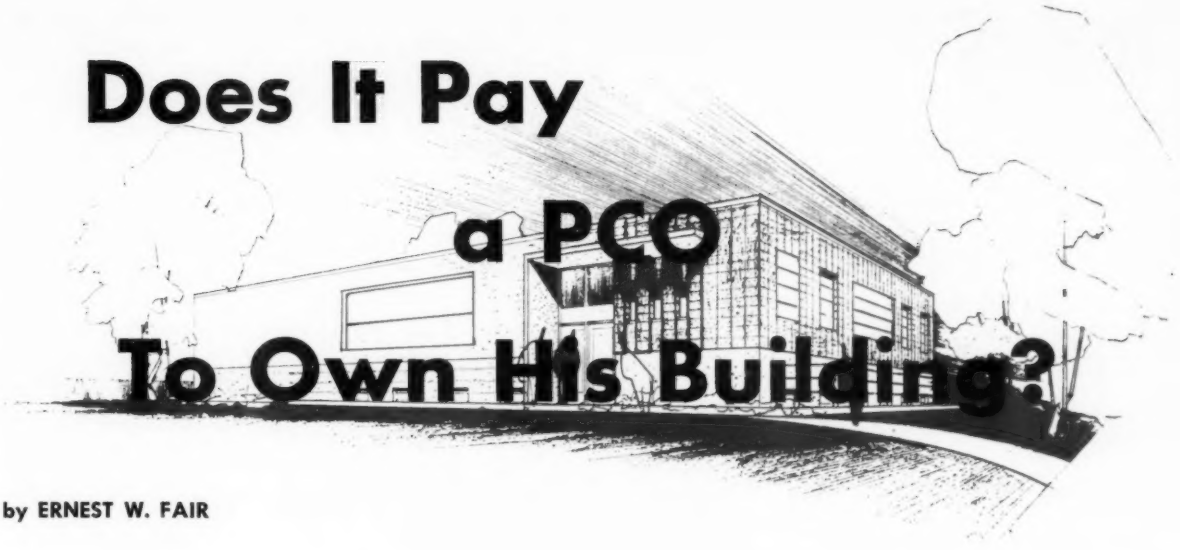
Does It Pay a PCO To Own His Building?



by ERNEST W. FAIR

Will Rising Rents Surpass the Cost Of Interest, Depreciation, Taxes?

THE CHICKEN-AND-EGG riddle is no tougher than the problem of whether or not it pays a pest control operator to build his own building or lease someone else's property. The solution must be found by each individual, for such factors as the local rental situation, business volume, financial resources, future prospects, and others must be considered. No ready formula exists.

But there are many experience reports which can be checked to find the solution. The following information is based on a close study of a large number of such experiences.

In the majority of cases where firm owners have built and financed their own buildings the arrangement has worked out profitably. In all of these, the economic and financial problems have been secondary to the use of good judgment and foresight in picking the location so that future business was assured.

How to Find the Answers

To seek a solution to the rent-or-own problem, there are some definite investigations to be undertaken before tackling the big one of financing.

A thorough and detailed investigation of the area is absolutely necessary. The best possible financing that can usually be handled will call for a 10 year amortization of the loan. That means the location selected must be a good one from a business standpoint for at least 10 years. To build otherwise is asking for financial troubles galore.

The individual type of business is, of course, not always dependent entirely on the prosperity of the immediate area but this should always be taken into account where the building may have to be rented. Its possible use to a tenant in some other line must be considered.

A lengthy series of talks with real estate men, a banker, and others who make it their business to keep close account of the pulse of the community, is essential.

And it must be remembered that financial obligations being undertaken call for a certain average monthly volume of business so an extended study should be made to assure that this needed volume will be the minimum rather than maximum possibility.

The financial side is of course of great importance. It is impossible to set a formula for every situation but procedure and general planning can be based on a typical example to simplify the problem.

Should a PCO be paying a $250 monthly rental for his business quarters, over a 10 year period this would involve a total expenditure of $30,000. In some areas an attractive single unit building can be constructed for that figure today. In others it may be more.

Financing Available

If the firm owner has $10,000 available he will need but $20,000 to finance this building. With interest rates now going up, the floor may be around 6% and if he can obtain 6% financing his interest cost the first month would be $100 and decrease to $91 the twelfth month. Amortization of principal on a $20,000 loan over a 10 year period would call for $166 per month payment on principal. If this is done, the total interest for the first year would be just over $1,000.

To this payment of $166 on principal, and slightly under $100 on interest, he must add taxes, insurance, small continuing repairs, and other costs of ownership not present under rental or lease which will make his monthly outlay in the neighborhood of $300 a month as compared to the $250 he is now paying in rent. This means a business housing cost in-

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This Month's Money Maker

Amazing New Entex Gives Both Immediate and Residual Control of Roaches and Other Insects!

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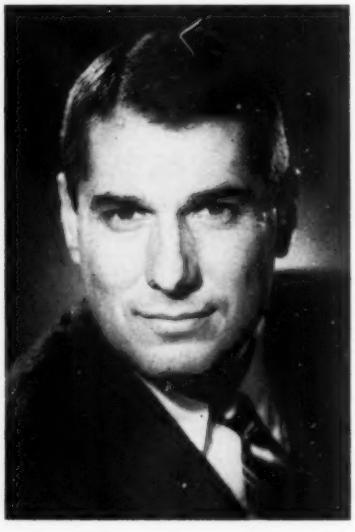

ENTEX* is an exciting new product, with USDA approval, now available at Thompson-Hayward for control of all strains of cockroaches, as well as ants, bedbugs, clover mites, crickets, lice, silver fish, spiders and many other annoying insect pests.

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You can see the inherent economies of using ENTEX as a pesticide. It has no odor and does not stain the surface where used. ENTEX is available from Thompson-Hayward to PCOs only.

Other Fall roach killing pesticides available from T-H are:

T-H Chlordane E-4 - 4 lbs./gal.
T-H Chlordane E-8 - 8 lbs./gal.
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Affiliate Philips Roxane
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Quality chemicals for your professional pest control operation

crease of $50 a month over present rental. Decreasing interest costs over the 10 year period will be offset by building repair in most cases.

The obvious factor over the long range picture is that in 10 years a PCO will have free and clear ownership of the structure, whereas under lease or rental he would have nothing.

This long range goal has made many small businessmen lose sight of their financial problems during the paying off period and many a small business has gone under simply because of lack of foresight applied to the immediate future.

Rent Extra Space

Another procedure, particularly for the small firm operation, is to build a two-store unit so that rental from the extra space can help carry the financial load.

Using the previous example, an investment of $50,000 can be figured as being needed for a two-store unit, where $30,000 would handle a one-store structure. If a PCO is able to handle the one-third downpayment on this cost it will require a $16,500 initial investment and leave a $33,500 balance to be financed. Write-off of principal on this amount over the same 10 year period would require $279 a month payments. First month's interest payment on this would be about $167 on the same interest arrangement.

This increased monthly cost is far offset by a return of say $200 a month which can be expected from rental of the second unit. It takes little figuring to see that where one can handle such an arrangement it will be much more financially sound and easier to amortise a two-unit building than one with a single unit.

All this depends upon the second unit being rented and staying rented every month throughout the pay-off of the loan principal. This important fact should not be overlooked.

Closest study to the rental possibilities of the space is a must. Best procedure is to secure a good tenant before building construction has ever been started. Such a tenant should be chosen with the utmost care and the lease secured from this individual should be the best a lawyer can obtain.

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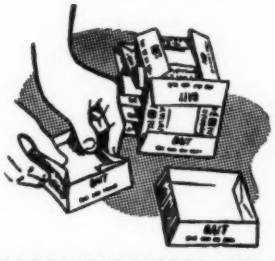

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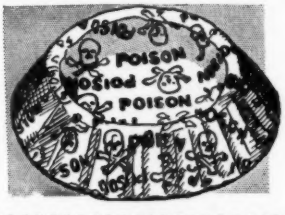

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Pioneers in Developing New and Better Equipment for the PCO

NPCA Members Question Management, Methods, Materials During Weeklong Convention in Miami Beach Last Month

Will new findings speed up action of anticoagulant rodenticides? Are certain painted surfaces taking the punch out of insecticides? How can better business management be introduced into pest control companies?

Such questions, and scores of answers, filled the air as over 650 delegates to the National Pest Control Association's 28th annual convention gathered at the Deauville Hotel, Miami Beach, Fla. PCOs exchanged fresh knowledge with a growing sense of professionalism, and heard experts in management, entomology, safety, and pesticides during sessions held October 16 through 23.

The resolute and energetic conclave was told by professional advisors they could make more money through better management. A major insurance firm showed how to gain profits through loss control, and new developments in rodent and roach control were presented by research men from universities and government agencies. Members themselves put new insecticides under scrutiny, and turned a careful eye on the old problems of safety and serviceman training.

Anticoagulant Speedup

Speedup of anticoagulant rodenticide kills through the addition of antibiotics and sulfa drugs is indicated in preliminary studies conducted at the Wisconsin Alumni Research Foundation, Walter W. Dykstra, U. S. Department of Interior, told PCOs. Dykstra said the investigation, now in its early stages, indicates house mice and roof rats will succumb more rapidly because the additions reduce the natural manufacture of vitamin K, which causes blood to clot and slows abnormal bleeding such as is caused in rats by an anticoagulant. He found less pronounced results from the additives on Norway rats.

The government agent did warn however, that hastening kill-time by reducing systemic production of vitamin K may increase secondary poisoning.

Although great advances are being made in rodent control, Dykstra said, new substances will not be available tomorrow. Industry vocabulary now includes such new words as chemosterilants, anti-metabolic agents, anesthetic agents, and synthetic sex attractants, he continued, but such tried-and-true toxicants as 1080 are still among principal weapons in the PCO's arsenal for fighting rodent infestations.

Biological activity of anticoagulant compounds varies, but end results are relatively the same with all standard formulations, Dykstra said. More important in mouse control, he added, is getting the animals to accept bait when other, more attractive, foods are available. The carrier is as important as the active ingredient, he emphasized.

Walter W. Dykstra (right) told of new rat, bird controllers. Before meeting, he compared notes with Howard A. Merrill (left), predator and rodent control expert from Washington.

Reduced Concentration Desirable

From cost standpoints, it is desirable to reduce the concentration of anticoagulants in bait formulations, Dykstra admitted, and said control of Norway rats has been achieved with 1/5 the level registered for use. He hesitated to include house mice or roof rats in this category, however, partly because their feeding habits, such as in food warehouses or around kitchens, may give them an adequate supply of vitamin K which reduces the effectiveness of these rodenticides that induce death by hemorrhage.

1080 Analogue

Research with other chemicals of interest to the PCO is going on at the Denver Wildlife Research Center, Dykstra disclosed. Scientists there are working on an analogue of 1080 which, through variance of the ph factor, may possess a controllable, predetermined period of toxicity.

Perhaps within a year, Dykstra predicted, there will be a counterpart of 1080 which will have short-lived toxicity, becoming non-hazardous after 48 or 72 hours.

Another Denver project is examination of microencapsulation, a process wherein toxicants are overcoated with a digestible, plastic-like material which masks tell-tale flavor, so that Norway or

Search for answers to resistant roach control, financed by NPCA, is spearheaded by these men (left to right): Clayton Wright, technical committee chairman; Dr. James McD. Grayson of VPI who is testing new candidate insecticides; and Dr. D. E. Howell, researching roach repellents at Oklahoma State U. Rutgers' entomologist Dr. Billy Ray Wilson is checking the relationship of roach materials to resistance, formulations, and surfaces treated. They gave delegates a summary of their current investigations.

roof rats will not refuse poison because of taste. This could be used on such products as Red Squill, Dykstra suggested.

Digestion time can be altered by changing thickness or make-up of the overcoat, so that PCOs may someday be able to pinpoint the speed of kill desired, he predicted.

Chloropicrin Examined

Denver researchers are broadening their knowledge of chloropicrin, Dykstra divulged. This tear gas chemical is in common use as a rodent deterrent in warehouses, where it is particularly useful on house mice. Studies reveal mice react differently to changes in concentrations of chloropicrin. At 1.2 ppm, the speaker said, mice register discomfort within 2 minutes. With 32 ppm, they try to leave the chamber; 160 ppm kills the rodents in 1 hour; and with 320 ppm, death results in less than ½ hour.

On this basis, Dykstra said, chloropicrin has even greater merit as a repellent or a lethal toxicant.

Birds Sleep to Avertin

Because bird control is becoming increasingly important, Dykstra's comments in this field held great interest for the assembly. Scientists are seeking quick, humane methods to control the winged pests, he revealed.

Avertin, a new product for controlling gulls, in airport tests was found to put birds to sleep within 3 minutes. Goal is to induce sleep in 30 or 60 seconds, Dykstra explained.

Dykstra hinted a new organophosphate, 100 times more toxic to birds than to mammals, is under investigation, but failed to go into details.

Scientists at Stanford, working in cooperation with the Interior Department, are probing ultrasonic and high-frequency sound machines to deter birds from building sites. Present findings are not too favorable, especially in spacious, outdoor areas, Dykstra acknowledged, but said encouraging results have been obtained using recorded distress signals originally emitted by frightened birds.

Dykstra said the bird problem is worst in the West. He cited a starling build-up in Oklahoma, and said winter concentrations of starlings around livestock feeding areas in the Midwest have become a serious problem. In one instance, 100,000 birds were caught in a single trap, and skies were frequently blackened by the hungry devastators. Holly growers in Oregon have found themselves with unmarketable crops because of the immigrant pests, who have forsaken their city homes to forage and wreak ruin throughout the trees.

Resistant Roach Studies

Several tests designed to study formulations used to treat resistant German cockroaches are being conducted by Dr. Billy R. Wilson, of Rutgers University, who brought delegates his latest findings.

In a 4-week, forced feeding test, insecticides formulated in oil were applied to plywood panels and allowed to age 1 day before introduction of roaches. First week's results found .5% and 1% Diazinon and 2% chlordane giving best results, with percentage of kill that ranged in high 80's or low 90's, Dr. Wilson showed. Longest residual time was noted with 2% chlordane.

In another test with susceptible roaches, various combinations of toxicants were examined. Concentrations were lowered to reduce hazards to levels that would exist if either was used alone, at full strength. It is apparent combinations are less effective than single insecticides are, Dr. Wilson said. Highest percentage of kill was reported with .4% Diazinon and .1% DDVP, but this mixture had no residual action. Next highest kill resulted from .25% Diazinon with 1.5% methoxychlor.

Resistant roaches collected by New Jersey PCOs were used in one experiment to determine the effectiveness of insecticides. Degree of resistance was determined by exposing these insects to panels treated with chlordane and noting the time required to knock them down compared to susceptible strains. Degrees of resistance varied, but findings clearly indicated the superiority of organic phosphates against chlordane-resistant roaches, Dr. Wilson maintained.

Combinations of toxicants were tested again, this time using resistant roaches. Results were poorer than when single chemicals were used, Dr. Wilson found.

Bigger Dose for Females

Tests with oriental roaches indicated Diazinon appears to be most effective. During comparisons of Diazinon's effect on male orientals and on females, it was discovered that a greatly increased dosage is required to kill females of the species. While .28% de-

Special honors were given Dr. Ralph E. Heal (left) for his service as association executive secretary since December 1953 during which time NPCA membership has increased by 50% to nearly 1,000. A bronze, engraved placque, presented him during the annual Thursday evening banquet, brought scores of congratulations. Here Mr. and Mrs. Kenneth C. Bell of Amarillo, Texas, take a close look at the citation.

stroyed all males, 1.58% eradicated only 85% of the females. So, with oriental roaches, as with other forms of animal life, the female is superior to the male, the scientist quipped.

With American roaches the story is the same, Dr. Wilson went on. About 6 to 8 times more insecticide is needed to kill females.

None of these tests is precise, Wilson paused to caution the group, and results may vary under field conditions, but they give an indication of what is happening.

Decreased Mortality with Rubber-based Paint

Dr. Wilson next applied a dull finish, alkyd, enamel-type paint to the plywood panels in an attempt to determine roach mortality rate on painted surfaces. Three coats of the common paint were used, and panels were aged for one month so that in theory they were chemically inactive. When formulations used on unpainted panels were applied to the painted ones, mortality was decreased in all instances.

Intrigued by these findings, Dr. Wilson carried his investigations farther with formulations applied to panels painted with enamel and rubber base paint, and to the unpainted check and the one covered with the flat base. Three formulations were selected for testing: chlordane in acetone, in water, and in oil.

The chlordane/acetone formulation gave 100% mortality on all four surfaces. Chlordane in water registered 100% on all but the rubber base paint, which gave only a 2.5% kill. Chlordane/oil showed 100% kill on the unpainted surface, but registered only 5% on flat base paint, 65% on enamel, and 15% on rubber base paint. In general, Dr. Wilson went on, results with chlordane in water on rubber base paint have been rather poor. The scientist felt the poor performance of chlordane in oil might be caused by the oil carrying the chemical into the paint.

Dr. Wilson said he used highly volatile acetone to reveal if poor kill results from absorption of the toxicant into the paint.

Wilson repeated the test using Diazinon instead of chlordane. Diazinon in acetone resulted in 100% mortality on all but the rubber base paint surface, which registered 0%.

Diazinon in water claimed 90% mortality on unpainted surfaces, 35% on flat base paint, 45% on enamel, and 0% on rubber base paint. In oil, Diazinon scored 100% on the unpainted surface, 5% on flat base paint, 10% on enamel, and again 0% on rubber base paint.

Dr. Wilson is currently examining rubber base paints in an attempt to solve the riddle of ineffectiveness on surfaces painted with this product.

Resistance Studies at VPI

"Stick with one material as long as it will work, and when resistance develops, switch quickly to another," Dr. James McD. Grayson, entomology chief, Virginia Polytechnic Institute, told PCOs in an informal discussion during his report on NPCA-sponsored roach control inquiries at VPI.

The simplicity of an answer to a once-difficult problem was cause for the smiles coming from insectcide committee chairman, Dr. Arthur Brody (right) of New York City, and PCO James P. Woodside of Houston, Texas.

Wednesday's round of 10 committee meetings was a popular feature with delegates this year. Here bird control chairman George L. Hockenyos (left) compares accomplishments with advertising committee chairman Robert O. Williams.

"Residual effectiveness has been determined for 9 insecticides, 3 at two concentration levels, in killing female German cockroaches from resistant and normal strains," Dr. Grayson said. Tempered Masonite panels were treated and aged for 2, 15, 30 and 60 days. Oil base formulations were used, predicated on a weight/volume basis; rates of treatment were 1 gallon per 500 sq. ft. and 1 gallon per 250 sq. ft.

"None of the materials showed residual effectiveness beyond 15 days when applied at the lower rate," the scientist declared. However, at the higher rate, excellent results were obtained after 60 days against both normal and resistant roaches with 1% Bayer 37,344 and Bayer 39,007.

Tests showed 0.5% Diazinon still gives fair to good control of resistant German cockroaches after 60 days.

"Bayer 39,007 gave the most rapid kill, followed by Hercules 8717 and Bayer 37,344. Treatments with Bayer 37,344 and Bayer 39,007 at 1% concentration left visible deposits on the panels," Dr. Grayson concluded.

Oklahoma State Roach Study

Reports on another NPCA research project came from Dr. D. E. Howell, head of Oklahoma State University's Department of Entomology. Studies are being conducted there on repellents to prevent roaches from resting; to prevent invasion into roach-free areas, such as uninfested apartments which adjoin infested quarters; and to use with baits or toxicants where poisons cannot be placed with safety or where dead roaches cause embarrassment or contamination.

"Laboratory tests underway are designed to measure a chemical's ability to prevent roaches from crossing a repellent barrier," Howell disclosed. Using an experimental repellent called R-874, Howell's group has been able to completely prevent oriental roaches from crossing over treated surfaces.

Researchers were able to stop all feeding by American roaches for 30 days, and by Germans for 15. This starvation technique, Howell said, is for use where other methods are impractical. "None of these materials is completely effective over the full spectrum of roaches," he cautioned.

To determine customers' acceptance of odors from the experimental chemicals, compound R-11 was placed in dormitory rooms on the Oklahoma State campus. Students who were asked for their reactions could not always detect an odor in rooms where the chemical had been placed. When odor was noticed, most students found the smell unobjectionable.

Dr. Philip Spear, NPCA technical director, described projects underway at the University of Georgia. Studies have been made to determine the ability of subterranean termites to tube over wood treated with various preservatives. Experiments revealed tubes were built over wood treated

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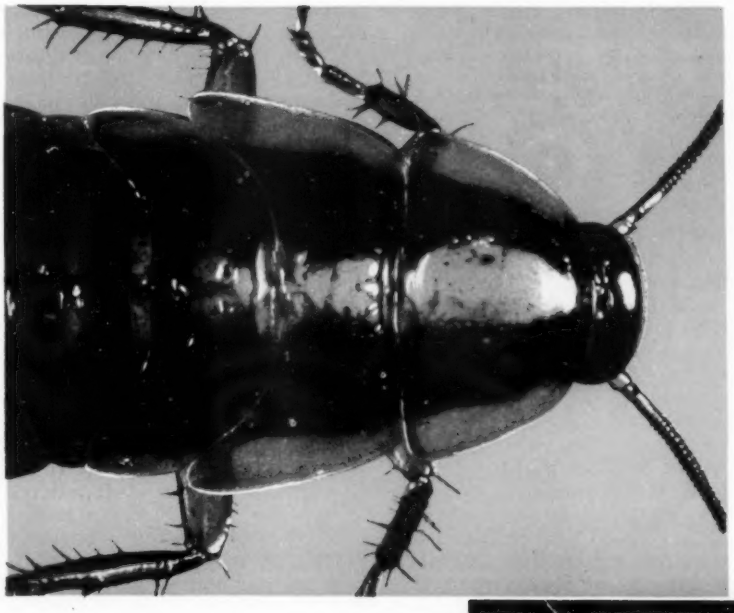

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How to gain industry stature in the community was a brain-storming session in which these PCOs presented ideas and techniques that worked for them (left to right, standing): James W. Steckel coordinator of the panel; J. C. Redd; Ernest P. Boland; Harold Schnorrenberg, and (seated) Truly Nolen, Jr.; Joseph A. Watkins; J. M. Keeney, and F. Peter Clements.

with creosote, osmose salts, pentachlorophenol, and Celcure.

Investigators next attempted to discover if subterraneans could tube over concrete which had been treated with aldrin, chlordane, dieldrin, and heptachlor. Rates of dilution were .001%, .01% and .1%. After three weeks, tubes over chlordane-treated concrete were found in all three instances. Concrete treated with .001% dieldrin and heptachlor both revealed tubing, but nothing was reported when the other formulations were used.

Committee Day

Busiest day of the convention was Wednesday when delegates either had to choose to sit in on only one of 10 concurrent technical committee meetings, or catch snatches of each by hopping from one to the other and staying for just 20 minutes or so.

Subjects that were covered, and the PCO chairmen who guided discussions, were: advertising (R. O. Williams, Evansville, Ind.), bird management (George L. Hockenyos, Springfield, Ill.), equipment (B. C. Scherzinger, Cincinnati, Ohio, and Frank Guenther, Philadelphia, Pa.), fumigation (R. Earl Dixon, Jacksonville, Fla.), insecticide (Dr. Arthur L. Brody, New York City), statistics (J. Edwin Sameth, Newark, N. J.), wood destroying organisms (E. Pat Mace, Tulsa, Okla.), insurance (Robert A. Oaks, and David A. Weisburger, New York City), public relations (James W. Steckel, Columbus, Ohio), rodent control (Joseph J. Wineburgh, Silver Springs, Md.), and transportation (Robert R. Schendel, Topeka, Kans.).

Most popular sessions were those devoted to insecticides and termite control. A complete resume of what happened at the termite committee meeting will be carried in the December issue of *Pest Control*.

Experiences With New Chemicals

Of four insecticides field tested by NPCA members this year, more time was spent on Entex because it had been made available to committeemen sooner. Others put through the PCO trials were Dibrom, Me 8707, and Kepone.

There were 35 reports on Entex, the organic phosphate of moderate toxicity. Of these, 22 said they achieved 100% control of German roaches; 7 obtained 90 to 99% control; 3 had "good" control; and 3 said they realized no control at all. Formulations of Entex ranged from .5 to 3% in water emulsions. Chairman Brody revealed results from the lower concentrations seemed to be equal to those with higher concentrations. Use of Entex on a wide variety of surfaces in differing geographical sections of the country brought about no staining problems. Testers also said the pesticide has a slow knockdown, no flush-out ability, but does give up to 3 months residual.

Me 8707, a 50-50 mixture of Dri-Die silica gel dust and glycol, plus pyrethrins and piperonyl butoxide, was found to have good flushing action on roaches, is not irritating to servicemen, and does not cause staining.

Field use of Dibrom liquid formulations in water or oil were tested on a limited basis. They were described as having a fast knock-down and good flushing qualities. Water formulations had little residual life, while oil base ones lasted up to 33 days.

Kepone ant and roach bait, available in pellets and as a 1/8% paste, is the latest candidate running through the NPCA field testing mill. It's too early to evaluate reports from PCO cooperators, for many of them are still coming in. The chemical appears to be gaining in acceptance, however, Dr. Brody reported.

Insect Problems in the Northeast

Major portion of the time was given over to hearing reports of insect problems from the five major geographical areas of the USA.

Martin Meyer of Philadelphia gave this rundown of more troublesome pests in the Northeast: resistant German roaches, openly marching across lawns from one house to another; brown dog ticks; fleas and ticks which often have been found in the holes of acoustical ceiling tiles; millipedes in Philadelphia; ground beetles, common around homes, garages, and apartment houses; cereal pests — mainly the saw-toothed grain beetle, and frequently in dried dog foods; face flies in rural areas; earwigs indoors; warf borers in wet wood, particularly in urban redevelopment projects; resistant bedbugs; carpet beetles; powder-post beetles in imported ornamental wooden sculptures; and elm leaf beetles.

Other delegates from northeastern states reported problems with psocids in new homes, strawberry root weevils in motels, Penn-

The "How-To's" of serviceman training came from this quartet of industry representatives: Standing is NPCA executive secretary Dr. Ralph E. Heal, and seated (left to right) are Thomas W. McCloud, coordinator of the discussion; Dr. Harlan R. Shuyler; and James V. Benschoter.

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sylvania wood roaches in newer housing developments, yellow jacket wasps, "paper fleas" attacking women in department stores which sometimes turn out to actually be pigeon mites in an unused air conditioning duct, and mosquitoes breeding inside new buildings.

In the Southeast

Athens, Ga. PCO Ernest Boland said there were really no major control problems in the Southeast, but that reports have been coming in of increased incidence of brown dog ticks; bedbugs, with 75 cases in his home town alone; resistant German roaches; carpenter ants; millipedes (he uses 5% Sevin dust sprinkled liberally around the house in a band and gets good control); chinch bugs that are extremely high in their resistance to parathion and are killed effectively by Trithion; earwigs; and termites in houses that are less than two years old.

In the Midwest

Chester Robinette, St. Louis PCO, explained his part of the country suffered from sporadic problems brought on by a cool spring. Among the more troublesome insects in this area are: resistant German roaches; ground beetles, especially around motels; ants of various kinds, including woodworking ants, particularly those in the hollow-core fillers of flush doors inside. One PCO spoke up from the floor to explain he had discovered carpenter ants in styrofoam that had been lightly treated with a fire-retardant which had enough nutrition to support the wood eaters. Carpet beetles in apartments are on the increase, as are millipedes, resistant bedbugs, face flies inside homes, picnic beetles, crickets, sowbugs, and horntails found in several carloads of lumber.

In the Southwest

James P. Woodside, of Houston, Texas, was spokesman for insect conditions in the Southwest. American roaches and the smoky brown roach are particularly difficult to control this year in suburban residences, under shingles, and inside unscreened chimneys, he said.

Other ardent arthropods include small carpenter ants, German roaches, sowbugs, chinch bugs, earwigs which are found in almost every home around the Gulf area and are being reported as far north as Dallas, and grain mites spotted in puffed wheat stored in a supermarket warehouse.

In the West

From Yakima, Washington, Claude C. Weaver came to tell delegates that cereal pests, particularly those in dog food and pet supplies, such as bird seed, are on the increase in his part of the country. In addition, he said, fellow westerners have reported more than the usual number of infestations involving: carpet beetles, brown banded roaches, earwigs, clover mites, carpenter ants, subterranean and dampwood termites, grain mites (cited in particular were those infesting a compressed straw insulation used in the ceiling of a house), Mediterranean meal moths, salt marsh mosquitoes, Bermuda grass mites, and black widow spiders.

Turning their attention to specific chemicals not discussed earlier, delegates listened to Robert Sharp of Prentiss Drug & Chemical Co. report that Butonate is now available in a new, more highly refined formulation and that dosage recommendations have been upped to get better results. For routine roach and fly control, Sharp said 1 to 2% Butonate is effective, but for cleanups he suggested increasing the strength to between 3 and 5%. For a 1% formulation of 20% technical Butonate, the proportion is 1 part chemical to 23 parts carrier; for a 1½% formulation the ratio is 1 to 15; for a 2% strength, 1 to 11; and for 3%, it's 1 part toxicant to 6½ parts oil or water, Sharp explained.

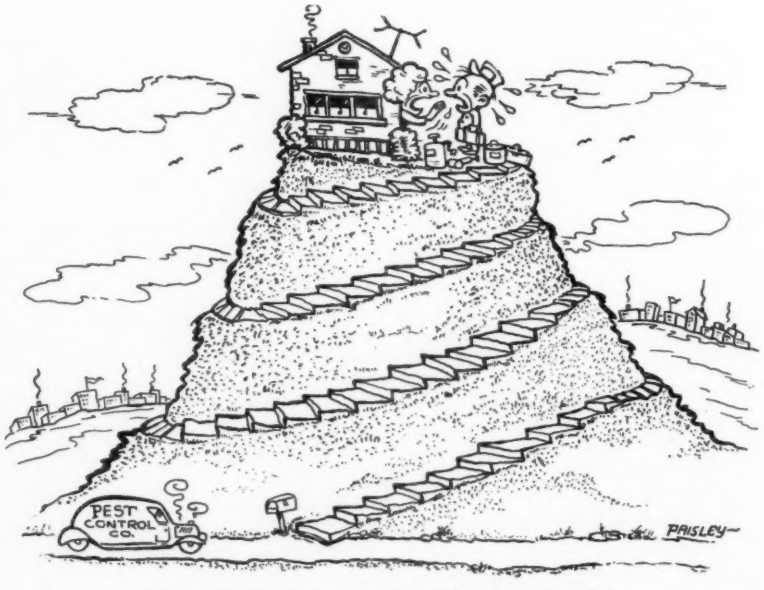
PCOs talking over the potential in bird control work concluded this is a vastly underdeveloped market that PCOs can profitably cultivate. Demand for elimination of birds is being stimulated by bird-caused crashes at airports, bird filth contaminating foodstuffs, marring of buildings, and publicity over the diseases they can carry.

George Hockenyos' bird management committee is actively searching for effective bird control methods. To date, however, his group admits successful erradication programs must depend upon the use of poisons. But the guiding principle by which these birdmen operate is to explore every other avenue to displace the feathered nuisances and to resort to poisons only if everything else fails.

Cut Fumigation Costs 25%

Delegates who chose to talk fumigation heard Doane Stuart, Dow Chemical Company researcher from Seal Beach, Calif., introduce a new approach to more effective gassing by integrating the major factors which influence it.

The initial concentration of a fumigant, its confinement, the temperature at the site of the termite, and the length of the exposure period must be in proper relationship to give the required dosage. This integration provides the most economical use of gas for assured results — for from 2 to 24 hours when the temperature is from 40° to 100° F and when half-



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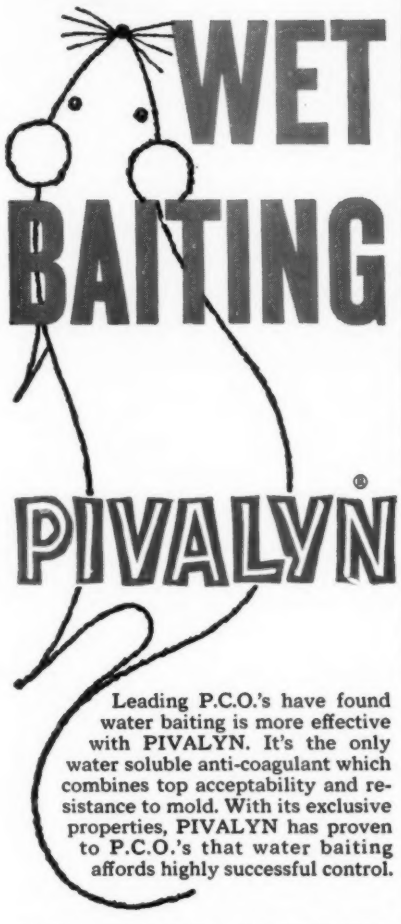

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loss time conditions vary from 2 to 24 hours. Half-loss time, Stuart explained, is the time it takes for half of a fumigant to escape from a structure.

For use with Vikane, the new Dow fumigant for drywood termites, these factors have been arranged for quick reference on a Fumiguide slide calculator which will be available from the Fumigant Sales Division of The Dow Chemical Company, Midland, Mich.

To appreciate the savings the Fumiguide can provide, a fumigator makes an interim measurement of fumigant concentration with a Fumiscope or GasMaster. He then takes this information and reads corresponding figures on the Fumiguide to decide what corrections can be made for discrepancies and thus save up to 25% of the amount of gas needed, Stuart explained.

While some might object to spending the time to make such an interim check, it was pointed out the larger the fumigation, the more expensive it is to have to refumigate because of insufficient gas concentration over a long enough time.

Fumigation Defined

In other action the fumigation committee tentatively agreed on a definition for fumigation to help with insurance, fire departments, etc. It is taken directly from wording passed by the California Legislature and became active on September 15, 1961. The definition reads,

"Fumigation shall be defined as the use within an enclosed space for destruction of plant or animal life, a substance having a vapor pressure greater than 5 millimeters of mercury at 25 degrees centigrade."

Clayton C. Wright, NPCA technical committee chairman, and operator of C. Wright Associates, Dallas, Texas, said his group recommends the association investigate desirability of establishing permanent committees on weed control and lawn insect control.

24,000 New Formulations

In the last five years, almost 24,000 new pesticidal formulations have been registered by the Pesticide Regulation Branch of the U. S. Department of Agriculture. PRB chief Justus C. Ward brought this out to dramatize the myriad of problems facing federal regulatory officials commissioned to protect the public from being exposed

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to improperly labeled and inadequately tested agricultural chemicals.

Acceptance of pesticides by the public has been more guarded in recent years. Now Mr. and Mrs. Consumer want to know not only if an insecticide will kill the bug they want to erradicate, but also if it's safe to use. "In the past six years the public has been hearing more and more about the danger of accidental poisoning," Ward explained. "Some of this has been caused by an unreasoning fear of poison, but part of this publicity has come from local Poison Control Centers' educational efforts to reduce accidents."

There appears to be some justification for such an education program. Figures based upon estimates of the Committee on Pesticides of the American Medical Association indicate some 10% of the accidental deaths from solid and liquid substances are due to pesticides. Thus, between 1954 and 1959, approximately 134 to 166 deaths can be laid to pest control poisons.

"These figures are too high, and it should be possible to reduce them since almost all of these deaths are preventable if pesticides are stored and used properly," the USDA enforcement official told his PCO listeners.

Dangerous Residues

But unfortunate health experiences associated with pest killers are not confined to fatal cases resulting from direct exposure to them. There is growing concern, too, over what hazards there may be from residues left in the premises following use of a pesticide.

"You are also well aware of the accidents which happen to children and pets that get into baits or dusts which your operators have placed. Often these accidents can be traced to carelessness on the part of an otherwise competent serviceman," he admonished.

"The reputation of the organized pest control industry will depend in the next few years on how rapidly it can improve its safety record," Ward predicted.

While most pest controllers are for safety in the same way they're against sin, the shackles of legislation will become even more restrictive if greater activation of safe operating procedures is not observed.

"There is still a trend toward new laws to specify the ways in which pesticides may be used, as well as to control the users themselves," the USDA spokesman explained. "With the impact of the Food Additives Amendments to the Federal Food, Drug, and Cosmetic Act on the control of pests in food warehouses yet to be felt, and public concern over poisons still rising, everything possible should be done to show that pesticides can be used both safely and effectively," he advised.

The Clements Boys were busier than a Florida fruit fly keeping local convention activities smooth. Brother Bill (left) of Leesburg posed for a minute while he became re-acquainted with brother Pete who has his PCO business in Ft. Lauderdale.

Lower Insurance Rates

And, if this kind of warning is not enough, Mr. Ward reminded NPCAers, this is "a good time to re-examine pest control practices to determine how they may be made safer so that lives can be saved, injury reduced, damage stopped — and insurance rates lowered!"

Portrait of the new NPCA executive family (left to right): secretary-treasurer Robert R. Schendel and his wife Mary Ruth of Topeka Kans.; new executive vice-president Paul K. Adams and wife Betty from Alexandria, La.; and first-lady Louise Houghton next to 1961-62 president Charles W. Houghton from Boston, Mass.

Need for Business Knowledge

"One of the most glaring needs of this industry is sound, bedrock business knowledge," Alexandria, La. PCO Paul K. Adams told delegates as he opened the first major session of the 1961 convention.

Adams introduced Paul M. Stokes, senior consultant, Rogers, Slade and Hill, a New York management advisory firm. Stokes and his associate, Hal A. Bergdahl, addressed the gathering and conducted a panel on modern management and its importance to the pest control industry.

Business in the United States is ailing from low profit margins, Stokes maintains. "A disease is creeping through American industry and it's symptoms are high gross and low net," he said.

Specialization Needed

Businessmen have a common desire to make money and to work less strenuously, Stokes pointed out, and called specialization the major steppingstone to this goal. Skill-hungry America can afford to pay for the specialist, he went on, and is willing to do so.

Specialized and professional in character, modern management is achieved by exercising five concepts. First of these principles is the ability to plan. Stokes described business as being like a jigsaw puzzle, with little pieces which must be carefully fitted together. To do this one needs thoughtful arrangement and systematic organization of business problems,

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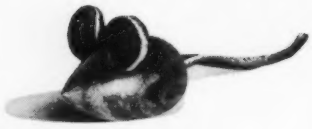

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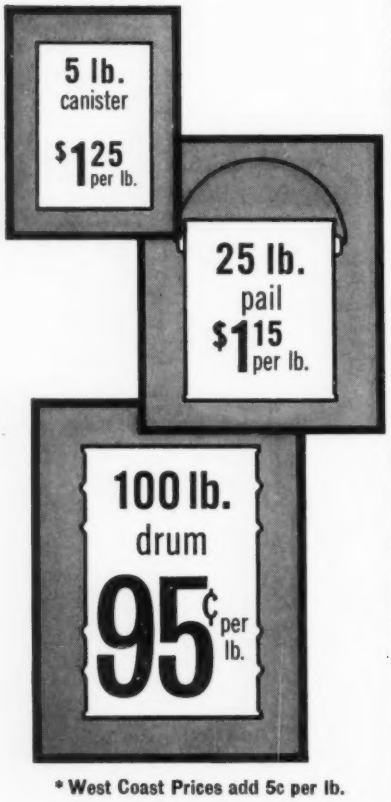

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principles and office procedures.

Second prerequisite for becoming a proficient manager is organization, the speaker said. This is as important in small companies as in large. Organization is the facility for putting work and people together so that results are obtained, he stated.

Ability to give clear instructions and direct other people was third on Stokes' list of qualities for management, and fourth was "coordinating skill," or, talent for bringing unity out of diversity.

Achievement of control is the final essential. This was described as a faculty for using other person's capabilities and setting up standards against which to measure personnel performance and project value.

Hal A. Bergdahl, the other consultant, spoke about the nature of the modern manager. Management is of crucial importance, he said, because what businessmen are saying, and how they are acting, has much to do with this nation's future.

A need to bring employees into management's confidence was stressed. "Ask your people for suggestions and opinions," Bergdahl advised, "then your business becomes a team action."

Probe Management Problems

Six delegates joined Stokes in a panel discussion of management problems as they apply to pest control specifically. Members were Willis D. Peters, Valley Pest Control, Inc., Spring Valley, N. Y.; John R. Cook, Cook's Pest Control Company, Decatur, Ala.; Howard L. Bell, Bell Pest Control Service, Independence, Mo.; E. W. Jamieson, Albright Laboratories, Tampa, Fla.; Harold L. Coleman, Faultless Exterminating Company, Kansas City, Mo.; and William Komoda, Vet's Termite Control, Honolulu, Hawaii.

Stokes asked the panel if any changes in the pest control business have affected management concepts. Cook replied that increased competition and lower prices made it necessary to seek more economical operation if profits are to be realized. Peters agreed, and said public acceptance of price increases in termite work has not been easily accomplished.

Cook underlined the importance of communication in explaining 12 month contracts clearly enough to prevent cancellation by customers after one or two treatments.

Money-making ideas presented to PCOs during management discussions on opening day were augmented Thursday by W. G. Macintosh, managing engineer with Hartford Accident and Indemnity Company, who stressed need for greater profits through loss control. Not only do accidents result in higher insurance premiums, or in some cases, in refusal of any insurance at all, but breaches of safety slash profits through dissatisfied customers, poor public relations, lost time, damaged equipment, and personal injuries to valuable employees.

"Examination of small accidents may reveal high losses," Macintosh said. Claims paid by insurance companies represent only awards for damage or liability; they do not reflect hidden costs such as loss of good will, delays, and other concealed factors, he maintained.

Accident-Prone PCO Ups Insurance

Macintosh cited, for example, a small PCO in New Jersey. In a period of 2½ years, 3 serious back injuries and 7 minor strains occurred in the firm, which had not delved into the causes for these mishaps. A study by Macintosh found the material storage area was badly cluttered. Underneath piles of cartons and small cans the PCO kept 55-gallon drums of liquids, a year's supply. It was determined all the back injuries had resulted from handling these drums, so the safety counselor suggested liquids be purchased and stored in 5-gallon containers, which was accomplished with the small extra charge of $54 per year.

Total claims cost of the 10 acci-

Prize membership booster was John J. Veatch, sales manager of Wood Treating Chemical's PCO division, who brought NPCA 24 new members this year and won trip to Miami Convention.

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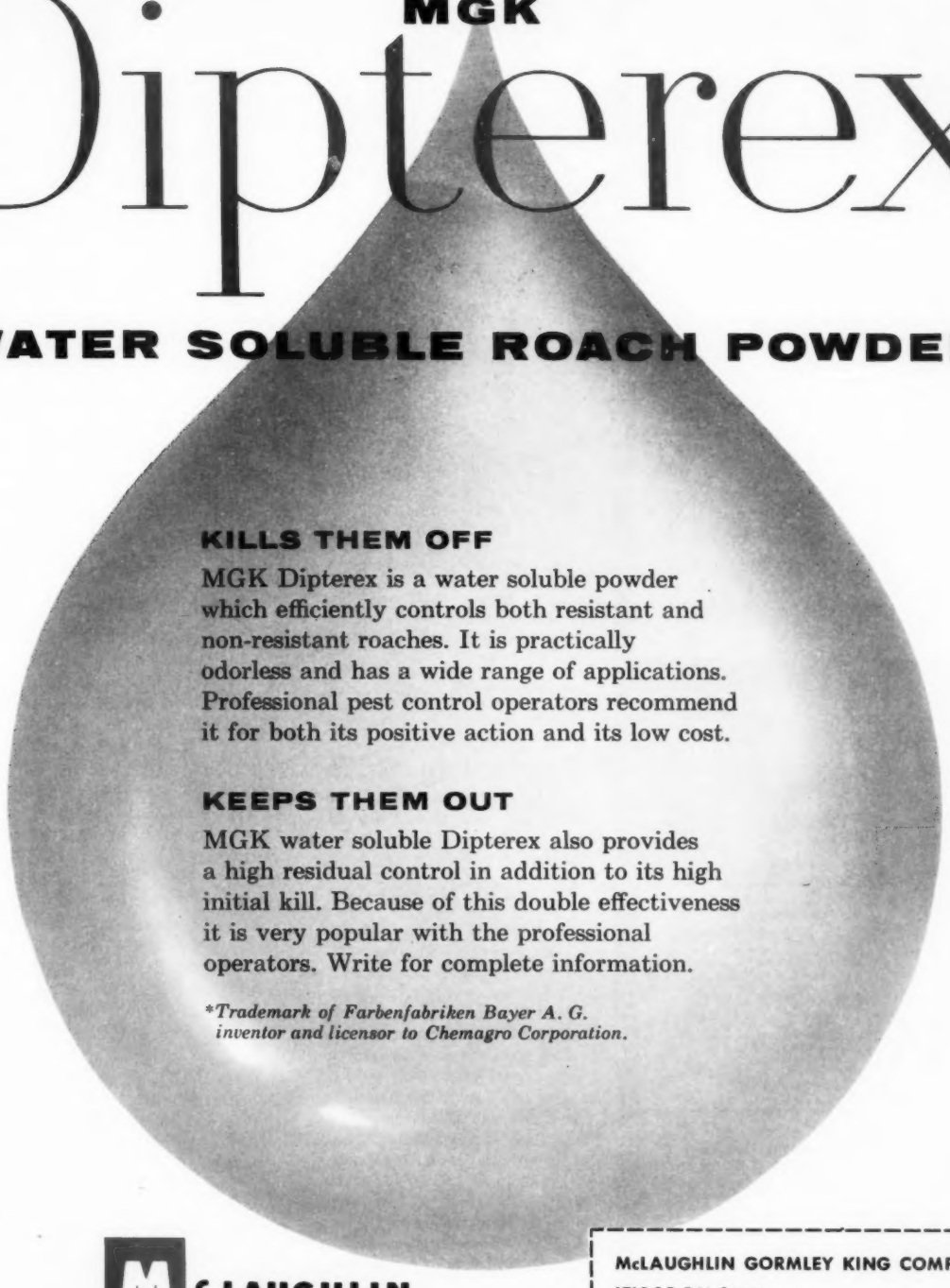

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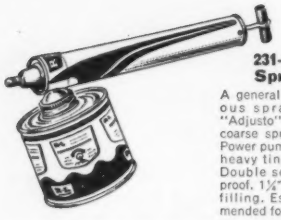

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276—Seal-Tight® Sprayer

4 gallon capacity, corrosion-resistant stainless steel tank, with exclusive Seal-tight locking cover and electrically welded seams. Easy stroking 1¾" x 15½" seamless brass pump. 42" oil and chemical-resistant hose, rotatable shut-off, 24" brass extension with exclusive Revolvo® nozzle that turns full circle.

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5 gallon stainless steel sprayer with a positive piston stainless steel pump developing pressures up to 100 lbs. Tank back has double wall for greater comfort. Dasher agitator keeps solution well mixed. Use with any spray material. Pump handle can be mounted right or left. 5 ft. hose, fully rotatable shut-off, 24" brass extension with exclusive Revolvo® nozzle.

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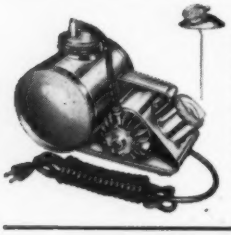

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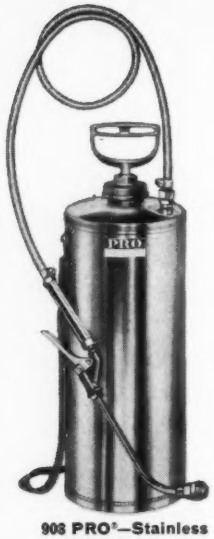

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dents was more than $5,000, and produced a workmen's compensation insurance debt as high as 49%. Today the PCO enjoys a credit of 20%. Macintosh contended this one small change saved nearly $7,000 a year.

Maintenance of equipment and astute choice of personnel are keys to a sound safety program, Macintosh advises. "Hit the bullseye when you hire employees," he urged. "Make sure your staff is physically and mentally fit, and check former employers to find out about applicant's health and performance records."

"There is no room for mistakes in this industry," he stressed.

In closing, Macintosh listed five points for eliminating safety problems: "Write down your own responsibilities, set up a systematic training program, teach safety, keep records of subjects discussed, and question employees' performances," he enumerated.

Serviceman Training

Delegates dug into the perennial problem of serviceman training in a Tuesday morning panel discussion chaired by G. Darrell Cardiff, Cardiff Pest Control, Inc., Santa Cruz, Calif. Panel coordinator Thomas W. McCloud, W. B. McCloud & Company, Chicago, Ill., stressed a need for safer, more efficient jobs. He introduced Dr. Ralph E. Heal, NPCA executive secretary, who examined rudiments of training problems.

Salient among training factors, Heal remarked, are two necessary skills: salesmanship and teaching ability. "No one learns anything unless he wants to," Heal said, "and servicemen must be 'sold' on learning."

Teaching adroitness can be reached through four simple qualities, Heal continued: sincerity, enthusiasm, knowledge of subject, and adequate time. Good teachers must be sufficiently prepared, both in knowledge and state of mind, he professed, and must also prepare employees by instilling in them a receptive attitude. PCOs should prepare servicemen by telling them what they are expected to know, he added.

Four major avenues are available for driving home ideas, the NPCA secretary said. Servicemen learn things by hearing them, seeing them, talking about them, and actually putting new techniques into practice.

Second panelist, Dr. Harlan

(Continued on page 40)

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Your cost - Case of 12 x 1 lb. cans @ $9.13 per case.
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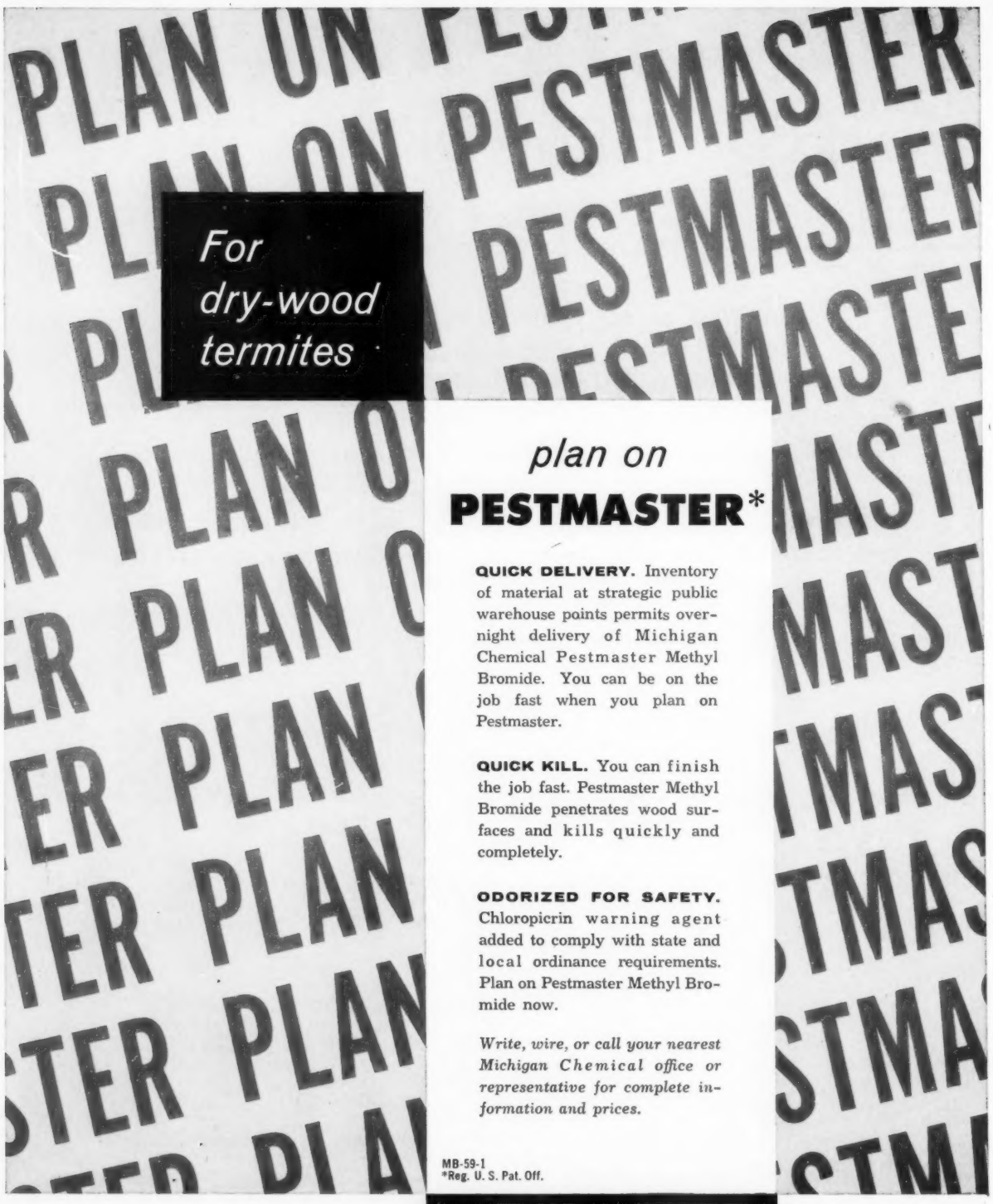
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Correspondence Course in Pest Control Technology

By DR. LEE C. TRUMAN*

Lesson No. 11

Bedbugs, Fleas, Lice, Parasitic Mites, and Ticks

MANY OF THE arthropods discussed in this lesson feed directly upon man or upon other warm-blooded animals. An animal which derives all of its food from the body of another living animal, which normally will feed more than once on the same individual animal and which usually does not directly cause the death of the animal upon which it feeds, is generally known as a *parasite*. The animal from which the food is obtained is known as the *host* of the parasite. Parasites which feed from the external surface of the host are known as *ectoparasites*; those discussed in this lesson can all be classified as ectoparasites. Some of these parasites are able to carry disease-causing organisms from one host to another. When they perform this function the parasites are called *vectors* of disease.

BEDBUGS

Order Hemiptera: Family Cimicidae

Bedbugs and their near relatives are universal pests of man and his domestic animals as well as of bats and birds. The sole food of bedbugs is the blood of warm-blooded animals. Common names used for the bedbug include "mahogany flat," "chinch," and "red coat."

An adult bedbug (*Cimex lectularius* Linn.) is about ⅕ inch long and ⅛ inch wide. Its reddish-brown to mahogany-colored body is greatly flattened and oval-shaped. After feeding, the body is greatly extended, becoming longer and much less flattened. Although the body is covered with tiny hairs, these hairs are so small that they are almost invisible to the naked eye so that the general body appearance is shiny. A bedbug has piercing-sucking mouthparts which enable it to pierce the skin and suck blood from its host. See Figure 11-A.

The bedbug egg is elongated and is firmly attached to an available surface when laid. Eggs are not known to be placed directly upon the body of the host. Each female lays about 2 eggs per day until she has laid an average of approximately 200. At normal room temperatures, these will hatch in 6 to 17 days, each producing small, almost colorless nymphs which have the general body appearance of the adult. The nymphs undergo a gradual metamorphosis through 5 instars before becoming adults.

There is a considerable variation in the rate of development, even among individuals hatched on the same day and kept under identical conditions. As a result of this, individuals in all stages of development are usually present in an infestation. Any nymph must have a blood meal in each instar in order to be able to molt. At room temperature, and with a readily available food supply, the nymphal period will last from 14 to 30 days. Bedbugs breed soon after becoming mature so that the time from egg to egg laying is approximately 4 to 9 weeks.

Habits and Habitats

The bedbug is a very hardy insect. Both adults and nymphs can survive for prolonged periods without food and under adverse temperature conditions. Adults can live for periods of a year or longer without feeding and can survive over winter in an unheated building. Nymphs are not as hardy as adults but still can survive for considerable periods of time.

Man is the preferred host for bedbugs but they will feed readily on other animals such as poultry, mice, rats, canaries, dogs, and cats when necessary. Normally the bugs feed at night, but in places such as theatres, offices, and rest rooms which are not ordinarily in use at night, they will feed readily during the daylight hours.

Bedbugs have been found in laboratory tests to be able to carry the causative agents for several diseases such as anthrax, plague, tularemia, yellow fever, relapsing fever, and typhus. In spite of the fact that bedbugs can carry these organisms, there is very little evidence that they carry them under normal conditions so that it can properly be said that bedbugs are not known to be an important factor in disease transmission.

During normal daylight hours, they hide in cracks and crevices which they can enter easily because of their extremely flattened body. Normal hiding places are in the folds and tufts of mattresses, coils of springs, cracks and hollow posts of bedsteads, and upholstery of chairs and sofas. They are not, however, restricted to these places. In heavy infestations, bugs are frequently found in such places as behind loose wallpaper, behind pictures on the wall, under door and window casings, behind baseboards, and even in light fixtures and medicine cabinets. The pest control operator must look for them in any place which can offer darkness, isolation, and protection.

Bedbugs give off a distinct odor from glands on the thorax. The experienced pest control operator can easily recognize this odor, particularly when the infestation is heavy.

As in most pest control work, it is necessary to make a thorough inspection to determine the extent of an infestation before beginning work. The operator must look in all of the normal hiding places and, in addition must remember that the bugs can and do wander considerably. Look carefully in all rooms immediately adjoining any room in which an infestation is found; the bugs can often be found in seemingly unlikely places such as cracks in the floor under carpeting,

*Correspondence Course Editorial Committee: Dr. John V. Osmun, Dr. Howard O. Deay, William L. Butts, Dr. Philip J. Spear, Dr. Harry D. Pratt, George L. Hockenyos, and James A. Nelson.

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Figure 11-A

A Pictorial Key to Some of the More Common Bugs Which May Bite Man.

(Special acknowledgement is given to Miss Janet Wolerstein who prepared most of the drawings used in this key.)

Body broadly oval: wings reduced to pad-like structures

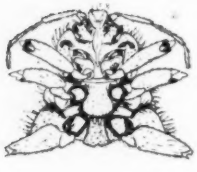
Body elongate-oval wings usually well developed

Prepared by William L. Butts

Middle and hind coxae nearly touching at center of body

Beak not reaching to hind coxae
CHIMNEY SWIFT BUG

Middle and hind coxae widely separated



Beak reaching to hind coxae
POULTRY BUG

Thorax with conspicuous crest which resembles half of a cog wheel

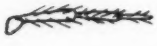
WHEEL BUG

Thorax normal, without conspicuous crest

Third and fourth antennal segments equal in length: body hairs long

BARN SWALLOW BUG

Fourth antennal segment shorter than third



Body brown or black, not marked with orange

Body dark, strikingly marked with orange areas

TRIATOMA spp.

Pronotum broad Its sides extending well beyond eyes

Pronotum narrow Its sides extending slightly beyond eyes

TROPICAL BEDBUG

Body brown Prothorax with two small rounded humps at front edge

MASKED HUNTER

Body black Prothorax without two small, distinct round humps at front edge

MELANOLESTES spp.

Wing pads narrow at inner margin

COMMON BEDBUG

Wing pads broad at inner margin

BAT BUGS

Note: Pictured above is a fore-wing of a bug of the family Reduviidae showing the typical arrangement of wing veins. Note the two closed cells lying side by side in the outer half of the wing. Bugs belonging to several other families resemble reduviids in general body shape, but do not have this pattern of wing veins.

behind electrical switch plates, in the folds of draperies, in unused ovens and broilers, and in the motor compartments of electric refrigerators.

Frequently, even when the bedbugs themselves cannot easily be found, their hiding places can be located by looking for the spots of fecal material which they often leave in easily visible places. These, together with the bloody spots left on sheets and pillowcases, when engorged bugs are crushed, serve as sure signs of an infestation.

CONTROL OF BEDBUGS

Bedbugs can be eliminated by fumigation. This procedure must be carried out only by personnel thoroughly trained in fumigation techniques. These insects are usually controlled by spraying with a residual insecticide which also has a contact killing action. Water emulsions or oil base solutions may be used. Large quantities of chemicals are not usually required, and a hand pressure sprayer is adequate for the job. Either a cone, fan, or pin stream nozzle is satisfactory, depending upon the surface treated. Most places in which bedbugs are found can be treated most efficiently by using a pin stream nozzle for cracks and crevices, and a fan or cone nozzle for mattresses, headboards, etc.

In treating, the operator must be very careful to spray all places where the bugs may hide. On the bed, treat each tuft in the mattress individually as well as the folds at the edges. Be sure to treat the bottom and sides of the mattress as well as the top. Pay particular attention to hollow frames and the springs, spraying inside any small coils which may be visible. On box springs, treat all folds and overlaps on the covering fabric. On the bed itself, treat all cracks and hollow framework. Spray under any loose baseboards and around all window and door casings as a minimum treatment. In addition, spray any other hiding places which may be found and do not overlook the possibility of hiding places in bureaus and other furniture in the room. A thorough application is essential to achieve adequate control.

Bedbugs in many areas have a well-developed resistance to the chlorinated hydrocarbon insecticides such as DDT and chlordane so that other insecticides may have to be used. Organo-phosphate insecticides such as malathion or Diazinon give good control. Premium grade malathion at 2% concentration can be used to treat surfaces with which people will not come into prolonged contact. Such surfaces as upholstery and mattresses should be treated with 0.5% malathion. Diazinon can be used at 0.5% on mattresses and upholstery and at 1% on other surfaces.

No residual spray should be used on mattresses used by babies or small children. For such articles, use a solution of 0.2% pyrethrins and 1% synergist for a contact kill. This solution can also be used safely in other places for contact kill, particularly where the infestation is light.

Dusts of any of these insecticides can be used in such places as under baseboards and under window and door casings if desired.

It is always desirable to do bedbug jobs early in the day so that the insecticide will have a good opportunity to dry before the room will be used for sleeping. It is particularly important to dry mattresses and bedding thoroughly before using them.

RELATIVES OF BEDBUGS

There are several species of insects which are closely related to the common bedbug and which are frequently mistaken for it. These insects also feed on blood and have body shapes very similar to the bedbug. They usually have preferred hosts other than man; however, many of them feed on man if the opportunity presents itself. The pictorial key in Figure 11-A can be used to separate the bedbug from some of these insects.

The tropical bedbug, *Cimex hemipterus* (Fabr.), is a tropical species which has become established in Florida. It is a parasite of man with habits very similar to those of the common bedbug.

Cimex pilosellus Horv., the bat bug, is a pest of bats which is frequently found in houses in the western United States. The bat bug of the eastern United States is *Cimex adjunctus* Barber. Bats are the primary host of both of these bugs; however, they can and often do feed on man. They can be distinguished from the common bedbug by the presence of long hairs on the body and by the characteristics shown in Figure 11-A. The European bat bug, *Cimex pipistrelli* Jenyns, is occasionally found in homes.

The first control measure with all bat bugs is to eliminate the bats from the building and seal all openings so bats cannot re-enter. After doing this, a thorough spraying or dusting with any of the usual residual chemicals will usually control them.

Another group of bugs resembling the bedbugs infests birds. A small bug of chimney swifts, *Cimexopsis nyctalis* List, is an occasional pest in homes in the eastern and midwestern states and is found as far south as North Carolina. This small light-yellow to amber-colored bug is 3 millimeters or less in size.

The swallow bug, *Oeciacus vicarius* Horv., and the European swallow bug, *Oeciacus hirundinus* (Jenyns), are found in swallow nests or in chicken houses and frequently infest homes. These bugs are usually confined to the nests of the birds and do not normally infest the house until late summer and fall when the fledglings leave the nests.

Cimex columbarius Jenyns is a common pest of pigeons, starlings, and other fowl. The poultry bug, *Haematosiphon inodora* (Duges), is a pest of birds. It can be distinguished from the common bedbug by the characteristics given in Figure 11-A.

To control these pests of birds, the birds and their nests must first be removed from the premises. Following this, a heavy application of sprays or dusts of any of the common residual insecticides will give control.

THE CONENOSE BUGS

Order Hemiptera: Family Reduviidae

A number of bugs of the family Reduviidae will attack humans occasionally, inflicting rather painful bites which may affect many people severely. Most of the insects in this family are predaceous on other insects, but a number of the members are definitely adapted to blood feeding. Some of these blood-sucking species are important as vectors of the causal agents of Chagas Disease.

TRIATOMA spp.

There are a number of species of the genus Triatoma (see Figure 11-A) and of a few related genera which make up the subfamily Triatominae. All members of this subfamily for which feeding habits are known feed solely on the blood of vertebrates. The blood-sucking conenose, *Triatoma sanguisuga* (LeConte), is probably the most widely distributed species in the United States. Infestations of this species are generally associated with substandard housing which is loosely built. This is particularly true in situations in which

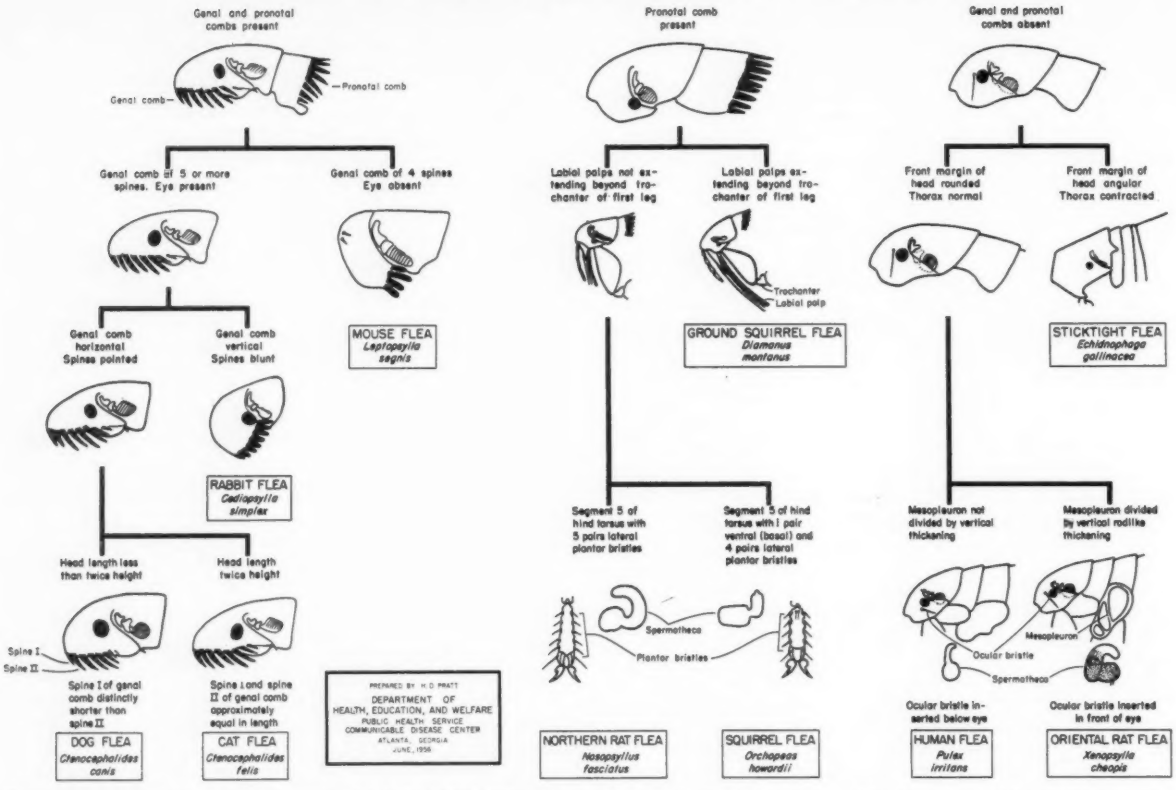

PICTORIAL KEY TO SOME COMMON FLEAS IN THE UNITED STATES
Genal and pronotal combs present
Genal comb
Pronotal comb
Genal comb of 5 or more spines. Eye present
Genal comb of 4 spines Eye absent
Genal comb horizontal Spines pointed
Genal comb vertical Spines blunt
MOUSE FLEA Leptopsylla segnis
RABBIT FLEA Cediopsylla simplex
Head length less than twice height
Head length twice height
Spine I
Spine II
Spine I of genal comb distinctly shorter than spine II
Spine I and spine II of genal comb approximately equal in length
DOG FLEA Ctenocephalides canis
CAT FLEA Ctenocephalides felis
PREPARED BY H. D. PRATT
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
COMMUNICABLE DISEASE CENTER
ATLANTA, GEORGIA
JUNE, 1956
Pronotal comb present
Labial palps not extending beyond trochanter of first leg
Labial palps extending beyond trochanter of first leg
Trochanter
Labial palp
GROUND SQUIRREL FLEA Diamanus montanus
Segment 5 of hind tarsus with 5 pairs lateral plantar bristles
Segment 5 of hind tarsus with 1 pair ventral (basal) and 4 pairs lateral plantar bristles
Spermotheca
Plantar bristles
NORTHERN RAT FLEA Nosopsyllus fasciatus
SQUIRREL FLEA Orchopeas howardii
Genal and pronotal combs absent
Front margin of head rounded Thorax normal
Front margin of head angular Thorax contracted
STICKTIGHT FLEA Echidnophaga gallinacea
Mesopleuron not divided by vertical thickening
Mesopleuron divided by vertical rodlike thickening
Mesopleuron
Ocular bristle
Spermotheca
Ocular bristle inserted below eye
Ocular bristle inserted in front of eye
HUMAN FLEA Pulex irritans
ORIENTAL RAT FLEA Xenopsylla cheopis

Figure 11-B. Pictorial key to some common fleas in the United States. (Figures 11-B, 11-D, and 11-G, courtesy of the Department of Health, Education and Welfare, Public Health Service, Communicable Disease Center, Atlanta, Georgia.)

the area immediately surrounding habitation and the crawl space beneath are open to the activities of domestic fowl or other animals. These bugs are usually brownish to black in background color and are strikingly marked with orange or red. (See Figure 11-A).

THE MASKED HUNTER

***Reduvius personatus* (Linnaeus)**

Another member of this family which inflicts a severe wound when it bites man is the masked hunter, sometimes called the "kissing bug." This is a widely distributed species which is common in the eastern and midwestern sections of the United States. This insect is not a bloodsucker but is predaceous on other insects. They bite readily, apparently as a defensive mechanism, when handled or otherwise disturbed. This is a grayish-brown bug without any outstanding contrasting markings (see Figure 11-A).

OTHER REDUVIIDS

A number of other species of this family are known to bite man on occasion. One of the most common of these is the wheel bug, *Arilus cristatus* (Linnaeus), a large black bug with a distinctive crest on the thorax. (See Figure 11-A.) Two smaller species which are also black and sometimes called the "black corsairs" sometimes enter homes and bite when handled. These insects belong to the genus *Melanolestes*. (See Figure 11-A).

CONTROL OF THE CONENOSE BUGS

The relationship of domestic animals to the presence of the blood-feeding conenoses has been discussed previously. Excluding domestic animals from both the actual dwelling, and from crawl spaces and similar areas, is important to a good control program. The presence of these animals represents a constant hazard since they represent a ready supply of blood which would be available if a reinfestation occurs. Homeowners and tenants should be encouraged to make any structural alterations which will help to solve such problems. General residual applications of 5% DDT or 0.5% lindane should be made. Such bugs as the "kissing bug" and "black corsair" are not normally feeders on mammalian blood. These insects bite man more or less by accident. The residual applications listed above are also effective against these bugs, but there would rarely be much need for structural corrections.

FLEAS

Order Siphonaptera

Fleas are pests of man and his domestic animals all over the world. While most of them prefer animal hosts other than man, many can and do feed readily on man when infestations are heavy or when other hosts are not readily available.

Fleas are small insects, without wings, averaging 2 to 4 millimeters long but varying from as small as 1 millimeter to as long as 8½ millimeters. The body is narrow from side to side and covered with spines which project backward making them well adapted for moving forward between the hairs or feathers of the host's body. Fleas have piercing-sucking mouthparts with which they penetrate the skin of the host and suck blood. Their long powerful legs permit them

to jump as much as 7 to 8 inches vertically and 14 to 16 inches horizontally.

Fleas have a complete metamorphosis, Figure 11-B. The smooth, rounded, light-colored eggs are about ½ millimeter long; large enough to be seen with the naked eye. They are laid in the bedding or nest of the host animal or on the animal itself. These eggs are not attached to the host and thus fall off and hatch out on the ground, in nests or bedding, in carpets, upholstery, or cracks in the floor. A female flea will lay a few eggs each day until she has deposited a total of several hundred. Depending on the temperature and humidity, these eggs will hatch in anywhere from 2 days to several weeks.

The larvae (see Figure 11-B) are small, active, worm-like creatures. Each has 13 body segments and chewing mouthparts but has no legs. They feed on all types of organic debris. Larvae often ingest feces of the adult fleas in which undigested blood is frequently found. This explains the presence of blood in the gut of flea larvae, a fact which has often been recorded. The larva grows through 3 instars in from a week to several months. A mature third instar larva will be from ⅛ to ⅙ inch long and 1/64 inch wide.

The mature larva spins a cocoon (Figure 11-B) covered with grains of sand, dust or other debris within which it pupates. Under good conditions, the adult will emerge from the pupa in 7 to 14 days, although under adverse conditions, this period may be as long as a year. Adults are ready to feed and mate when they emerge from the pupa.

Fleas are of great importance as carriers of causal organisms of disease. For this reason, it is necessary for the pest control operator to know the habits of the different species as well as to know how to identify each of the common ones. It is very important that the pest control operator identify the species of flea with which he is working. In case the flea is one which can transmit plague or typhus, he should notify his local health authorities immediately so they can determine whether or not a hazard to the public health exists. The characters used in flea identification are not difficult. Reference to the key, Figure 11-B, will serve to identify most of those which will be found in pest control operations.

CAT FLEA, *Ctenocephalides felis* (Bouche) and DOG FLEA, *C. canis* (Curtis) Family Pulicidae

The cat flea and the dog flea are 2 very similar fleas which occur throughout the United States, the cat flea usually being more common than the dog flea. Both of these species prefer dogs, cats, or man as hosts, although they may be found on a wide variety of other animals including rats. They prefer locations where dust and organic debris accumulate and are found commonly in houses, under buildings, and in yards. Both of these fleas are intermediate hosts of the dog tapeworm, *Dipylidium caninum* (Linn.) which is common in both dogs and cats. Children, when playing with their pets, can become infested with this tapeworm through accidental ingestion of infested fleas.

HUMAN FLEA

***Pulex irritans* Linnaeus, Family Pulicidae**

The human flea is commonly found throughout the United States and is the most common flea in homes on the Pacific Coast. It can survive on human hosts exclusively but is regularly found on swine and occasionally on dogs. This flea has been infected with plague in the laboratory and has been shown to be capable of transmitting bacteria although it is not a normal carrier of disease.

ORIENTAL RAT FLEA

***Xenopsylla cheopis* (Rothschild) Family Pulicidae**

The oriental rat flea is the chief carrier of the causal organisms of bubonic plague and murine typhus. It is most common in seaport towns where it has been introduced by both the Norway and roof rats but is well established throughout most of the United States. It is one of the most abundant rat fleas in the southern states and in southern California. Its preferred host is the rat, although it does occasionally bite people.

NORTHERN RAT FLEA

***Nosopsyllus fasciatus* (Bosc.) Family Ceratophyllidae**

This flea commonly infests rats and mice throughout the United States and is the most common rat flea in the northern states. It may transmit plague organisms from one rat to another but does not usually bite man.

STICKTIGHT FLEA

***Echidnophaga gallinacea* (Westw.) Family Pulicidae**

The sticktight flea is a prominent pest in the southern and southwestern states where it is primarily a pest of poultry but also attacks other animals, including man. Adult females attach firmly to the host, forming severe ulcers on the head or neck of domestic fowl, on the ears of dogs, cats and rats, and almost anywhere on man. While the adult females remain attached to the host throughout their life, the larvae drop to the ground to feed on organic matter so that all stages can be found in poultry yards and surrounding buildings. This flea has been found infected with plague and it can be infected with murine typhus. The fact that the female normally lives on only one host, however, reduces its importance as a vector of these diseases.

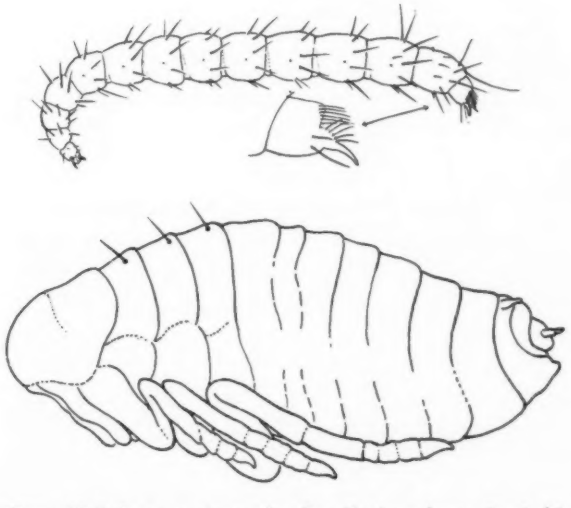


Figure 11-C. Immature stages of a flea. The larva (upper drawing) is found in the bedding of infested animals as well as on the ground in areas which infested animals frequent. The pupa (lower drawing) is found in the same places. It is usually covered with small bits of debris, and it is difficult to recognize. (From "Larvae of Insects," by Peterson.)

MOUSE FLEA

***Leptopsylla segnis* (Schönherr)**

Family Leptopsyllidae

This flea is commonly found on rats in the Gulf states and in California and less commonly on the house mouse in the same areas. In heavy infestations of rats and mice in buildings, these fleas can become a problem indoors.

CONTROL MEASURES

Control of fleas involves control on the infested hosts as well as control on the premises. Various home remedies are available for use on pets; however, the pest control operator should not attempt to control fleas on dogs and cats, but should suggest that the owner consult a veterinarian.

To control fleas on the premises, all infested debris should be removed, infested bedding of pets should be washed or destroyed by burning, and debris on the ground around kennels and poultry houses should be removed.

After removal of bedding and debris, residual spray or dust applications should be made to all infested areas, such as kennels and runs, lawns, under buildings, basement floors, carpeting, under baseboards, and to upholstered furniture where it is infested. Where the fleas have not developed a resistance to the chlorinated hydrocarbons, 5% DDT, 0.5 to 1% lindane, or 0.5% dieldrin applied at a rate of one gallon per 1,000 square feet of surface will give good control. In cases of resistance, 2% malathion or 0.5% Diazinon can be used. When using dusts, 10% DDT or 2 to 5% malathion are satisfactory. One of the most rapid and effective remedies for flea infestations is a general treatment with 0.5% DDVP.

Where it is necessary to treat lawns, the preferred formulations are wettable powders and dusts. Water emulsions can be used provided the solvents in them will not burn plants. Oil solutions should not be used on plants.

It must be remembered that flea infestations can occur even where there are no obvious animal hosts on the premises. When pets have been removed, as during vacation periods, larvae will continue to develop. When people return, the newly developed and starved fleas will feed very vigorously and often cause severe irritation. When rats or mice are eliminated from a building, their fleas will frequently feed on man. In all cases of elimination of rat or mouse infestations, it is a good idea to spray or dust for flea control as a precautionary measure.

LICE

Orders Anoplura and Mallophaga

The members of the orders Anoplura and Mallophaga are known collectively as lice. All known members of both orders are wingless parasites of warm-blooded animals, but the members of the 2 orders differ considerably in structure and feeding habits. The order Anoplura is made up of members which have sucking mouthparts and which feed upon blood. The members of the order Mallophaga have chewing mouthparts and feed on skin scales and secretions.

Because all of the lice are parasitic and spend virtually their entire lifetime on the host, the pest control operator is seldom directly involved in the actual process of louse control. In practically every situation encountered, successful louse control involves direct treatment of the host animal. The responsibility for such treatments belongs to physicians and veterinarians. Lice are considered in this chapter so the PCO will be able to identify those which occur on man.

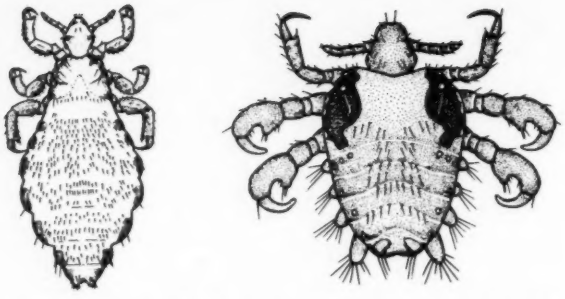


Figure 11-D. Lice which are parasites of man. The human louse (left) is a complex of two subspecies which are parasites of man. Note the elongated abdomen which does not bear distinct lateral processes. The crab louse (right) has distinct hairy processes on the abdomen and 6 spiracles on the top of the first segment of the abdomen.

SUCKING LICE, Order Anoplura

The order Anoplura is a rather small one, containing approximately 500 species, 2 of which are parasites of man. The antennae have no more than 5 segments, the head is narrower than the thorax, and the thoracic segments are fused and cannot be moved independently from the abdomen. In practically all species in which the life history has been studied, the eggs, young and adults are all found on the host. Only mammals are parasitized by members of this order. The adult female attaches the eggs to the hair of the host, and the young and the adults suck blood from the host.

HUMAN LOUSE

***Pediculus humanus* ssp., Family Pediculidae**

This species has been the subject of spirited controversy among experts on the classification of this group. Biologically there are 2 rather distinct patterns of behavior within the species, and many authorities feel that this is actually a complex of two species. These 2 entities will be considered as subspecies in this discussion.

The human louse is important from the standpoint of its activities as a parasite, but is even more detrimental to human welfare as a means of spreading the causal organisms of typhus and relapsing fever. Circumstances that cause large numbers of people to be crowded together under insanitary conditions are most favorable to the rapid development of large louse populations, and this fact accounts for the ever present danger of typhus outbreaks in such situations.

BODY LOUSE

***Pediculus humanus humanus* Linnaeus**

This is the larger of the 2 subspecies involved, being generally more than 3 millimeters long, and the integument is relatively soft. (See Figure 11-D).

Probably the most important characteristic which differs in the subspecies is the tendency of the body louse to remain on the body of the host only during the actual process of feeding. When not feeding, the body louse conceals itself in the clothing of the host. Associated with this behavior is the habit of placing the eggs on the fibers of the garments of the host instead of attaching them directly to the body hair. This type of egg placement is probably a unique habit which does not occur in other sucking lice.

Since treatment of the clothing of people infested with body lice is an important part of any control procedure, the PCO may often play an important part in louse control programs. Infested clothing can either be fumigated or it can be sprayed with 5% DDT or 0.25% lindane. Dust formulations (10% DDT or 1% lindane) can also be used. In some parts of the world, this insect is resistant to DDT and/or lindane. In such cases, clothing can be treated with 4% malathion dust.

HEAD LOUSE

***Pediculus humanus capitus* DeGeer**

The "typical" head louse rarely exceeds a length of 3 millimeters, and the body wall is, in general, a little more deeply pigmented and somewhat tougher than that of the body louse. All stages of the life cycle are spent on the host, and the eggs are attached directly to the hairs of the host. Control of this species involves direct treatment of the host and is usually considered as a medical problem. (See Figure 11-D).

CRAB LOUSE or PUBIC LOUSE

***Phthirus pubis* (Linnaeus), Family Phthiriidae**

The crab louse is a parasite of man, and while usually concerned with infestations of the pubic and perianal regions, it may be found in any region of body hair. All life stages are spent upon the body of the host, and the eggs are attached directly to the body hairs of the host. This insect does not move around much on the body of the host, and may remain stationary with the mouthparts inserted into the skin for several days at a time.

The crab louse is smaller than the body louse and the head louse. Specimens are rarely more than 2 millimeters long. The body is broad and short, and the front legs are much smaller than the second and third pairs of legs. The first apparent abdominal segment bears a total of 6 spiracles on its upper surface. (See Figure 11-D).

Control measures for this insect involve treatment of the host.

SUPPORTIVE MEASURES IN LOUSE CONTROL

Although complete control is practically impossible to accomplish without treatment of the host, there are certain supportive measures which are often of considerable value in preventing the spread of louse infestations among groups of people whose daily activities cause them to associate very closely with each other.

Places such as locker rooms in industrial establishments, gymnasiums, etc., can be treated with residual insecticides so that any louse that may fall or be knocked from an infested person could come in contact with the treated surface before establishing itself on another person.

The treatment of the inner surfaces of lockers can be particularly beneficial in attempting to control body lice. It is not unusual for numerous lice to remain on a garment of an infested person. If such a garment is then hung in the locker so that it remains in contact with the treated surface overnight, the exposure to the toxicant may be sufficient to cause a significant degree of mortality. It is well to bear in mind that, although such treatments are often of value, they cannot be expected to bring about complete control.

OTHER SUCKING LICE

There are a number of members of the order Anoplura which may be encountered by the PCO, particularly those which are parasites of domestic animals. Most of these are rather difficult to identify on the basis of structural features alone, but most of them are quite host specific. (A parasite is said to be host specific when it is found upon one host species in virtually all cases.) Tentative identification of the lice in question can be arrived at by proper identification of the host. All of these parasites spend the entire life upon the host.

CHEWING LICE, Order Mallophaga

The order Mallophaga is one of the smaller orders embracing approximately 2600 species, all of which are parasitic upon either birds or mammals. The eggs are attached to the hair or feathers of the host and the entire life cycle is spent upon the body of the host. In most cases, the insects are unable to survive for more than a few days when removed from the host. The host specificity noted for sucking lice is equally important in biting lice and there are no known Mallophagan parasites of man.

Members of this order have chewing mouthparts; the head is always wider than the thorax; and the antennae are short and made up of no more than 5 segments.

With the exception of occasional situations in which these parasites may survive for a few days after the death of birds, the PCO will seldom be concerned with their control. In such instances, residual treatments consisting of sprays containing 2 to 3% malathion or of 4% malathion dusts will be effective. Such situations may become more common as more emphasis is placed upon bird control operations.

MITES

Class Arachnida: Order Acarina

The members of the order Acarina are known collectively as mites. This is an order which consists of a very large number of species, most of which are of very small body size. Mites have no antennae, and the head and thorax are fused into a single region known as a *cephalothorax*. There appears to be a region resembling an abdomen in some mites, but many of them have the cephalothorax and abdomen combined into a single structure in which no evidence of distinct body regions can be found. The mouthparts are grouped together at the anterior end of the body in a sort of "false head" known as the *capitulum*.

The larval stage which hatches from the egg has only 3 pairs of legs, but with the molt to the second or nymphal stage of the life cycle, a fourth pair of legs appears. The adults also have 4 pairs of legs. Some very specialized adults may have fewer than 4 pairs of legs, and in some mites the nymphal stage does not occur, the larvae molting directly to the adult stage. In other specialized forms, the females produce living nymphs instead of larvae.

Most mites are so small that they are barely visible to the naked eye. The extremely costly optical equipment needed to study mites, properly combined with the rather unique terms used for the various body structures, present a formidable stumbling block to the PCO who is interested in the identification of mites. Detailed descriptions of suitable nature for positive identification are beyond the scope of this course. Information of this sort can be found in the selected references listed at the end of the lesson.

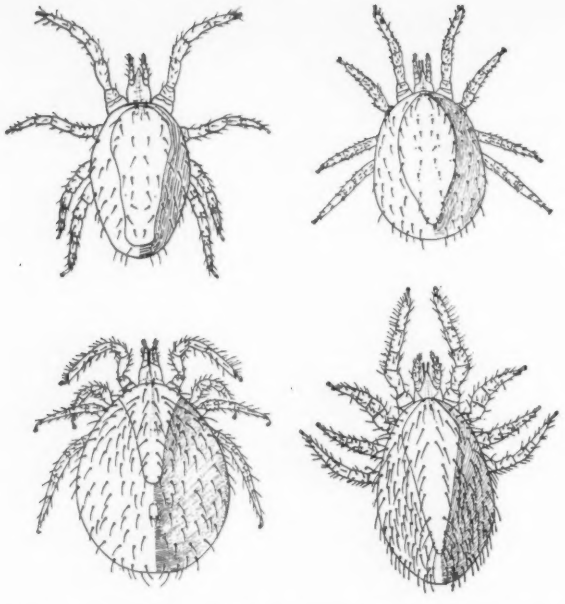


Figure 11-E. Mites parasitic on other animals but which may attack man. The chicken mite (upper left) is a common parasite of domestic fowl and wild birds. The northern fowl mite (upper right), like the chicken mite, occurs commonly on both wild and domestic fowl. Invasions of homes by these pests often occur just after the young birds leave the nest. The mouse mite (lower left) is often found in great numbers associated with the house mouse. It is a proven vector of the causal agent of Rickettsial pox. The tropical rat mite (lower right) is a common parasite of rats, and may occur in great numbers immediately after a rodent control program is completed. (Figures 11-E and 11-F courtesy of the National Pest Control Association.)

TROPICAL RAT MITE
***Ornithonyssus bacoti* (Hirst)**
Family Dermanyssidae

This common parasite of the Norway rat is found commonly in the warmer parts of the United States but it may be found in small numbers almost anywhere. It varies in color from bright red to black with whitish markings. See Figure 11-E.

Engorged females begin laying eggs 2 days after feeding and continue laying for 2 to 3 days. These are usually laid in groups in materials in the rat nest but not on the rat itself. The eggs hatch in 1 to 2 days into 6-legged larvae which molt in about 24 hours to become protonymphs with 8 legs. Protonymphs feed and molt in about 24 hours to become deutonymphs. These do not feed but molt in 24 to 36 hours to become adults.

This mite readily feeds on man, even where rats are abundant, causing intense itching and skin irritation. In infested buildings, they can be found on basement walls, kitchens, bathrooms, in drawers and near hot water pipes.

NORTHERN FOWL MITE
***Ornithonyssus sylviarum* (Canestrini & Fanzago)**
Family Dermanyssidae

This mite is a pest of domestic fowl and many wild birds throughout the temperate regions. See Figure 11-E. It frequently attacks man and causes severe itching. It normally lives only on its host, however, it may leave the body of a dead bird to feed on man. It very commonly migrates in great numbers from nests of house sparrows and starlings after nestlings depart. At such times, this mite may become a very serious pest.

CHICKEN MITE
***Dermanyssus gallinae* (DeGeer)**
Family Dermanyssidae

This is also a pest of domestic fowl and many wild birds. Its appearance and life history are very similar to those of the northern fowl mite. See Figure 11-E.

MOUSE MITE
***Allodermanyssus sanguineus* (Hirst)**
Family Dermanyssidae

This mite, a parasite of mice, carries the causal organism of rickettsialpox. It is sometimes known as the Pomerantz mite because of research done on it by the pest control operator, Charles Pomerantz, of New York. It is a common household species. The mite leaves the mouse after feeding and is frequently found on walls and other areas from which it can contact man. (See Figure 11-E).

CHIGGERS, *Trombicula* spp.
Family Trombidiidae

Chiggers are the larvae of the common, harmless harvest mites. They are extremely small, and unless they are fully engorged they are generally invisible to the naked eye. They are found in all states, and they are active throughout the year in the southern states. In the northern states their activity is confined to the late spring and summer months. Chiggers feed on a number of hosts including rabbits, dogs, horses, rats, mice, snakes, poultry, turtles and toads. (See Figure 11-F).

Eggs are laid on the soil, and after hatching, the larvae wander about until a host is located. When the larvae crawl onto man, they generally move about until they reach a place where clothing touches the skin rather closely such as under socks, garters, around the waistline, or under girdles. Contrary to a widely held popular belief, chiggers do not burrow into the skin. After piercing the skin, the chigger introduces a salivary secretion into the wound. This fluid causes the surrounding tissues to harden, thus forming a little tube of hardened flesh. The chigger then draws body fluids from the host through this tube. After about 24 hours more or less, depending upon the reaction of the individual host, a characteristic red welt with a white, hard central area appears on the skin. This apparently results from the reaction of the host's body to the protein in the chigger's salivary fluid, and its appearance is accompanied by an intense local itching at the site of the welt.

Figure 11-F. The larval stage of a chigger. It is this stage of the life history which is parasitic on man and other animals. The chigger is very small and quite difficult to see with the naked eye.

CONTROL MEASURES

CONTROL OF RODENT AND BIRD MITES

The first general rule for ridding a structure of rodent mites is to eliminate the host animals. Application of residual toxicants should be made to all rodent runs and to the general floor area in infested parts of the building. In the case of bird mites, all nests must be removed and the area immediately adjacent to the nests must be sprayed thoroughly with residual toxicants using a fan or cone nozzle to cover the area completely.

A number of the more commonly used residual insecticides have been used successfully in the control of these mites. Sprays containing 5% DDT, 1% lindane, 2% chlordane, 2% malathion, or 0.5% Diazinon have all proven to be effective. Dust formulations of these same toxicants can also be used.

In a great number of cases in which problems are caused in homes by the activities of bird mites, the hosts have already left the premises. Even though this is the case, nests should be located and removed whenever possible since they provide excellent sources for the development of natural populations of some of the most destructive fabric pests.

The same insecticides as are used in the control of rodent mites can be used at the same dosages for the control of bird mites.

CONTROL OF CHIGGERS

Control of chiggers can be obtained by treating lawns and shrubbery with emulsions of 1% chlordane or 0.2% lindane, making the application at the rate of 20 gallons of finished spray per acre. Wettable powder and dust formulations of chlordane applied at the rate of two pounds of actual per acre and similar formulations of lindane or of BHC at rates of 1.25 to 1.5 pounds of the gamma isomer per acre will be effective and will lessen the danger of injury to plants. In determining the sites in which treatment will be necessary, the PCO must not forget that the chigger has generally come in contact with the host approximately 24 hours before the characteristic bites appear. It is important to find out where a person has been during this 24 hour period in order to prescribe the proper treatment.

TICKS

Order Acarina: Suborder Ixodides

Ticks are the largest and most conspicuous members of the order Acarina and are practically the only members of the order which can be identified without the aid of a microscope. The ticks differ from other mites in a number of structural features. The only one of these features which is easily seen is the spiracular plates (also called stigmatal plates) which surround the external openings of the respiratory system. In the ticks, these plates are rather broad and well-developed and are placed just outside the bases of the third and fourth pairs of legs.

All ticks feed exclusively on the blood of vertebrates.

There are 2 families of ticks which contain most of the species in the suborder. These are the Ixodidae or hard ticks and the Argasidae or soft ticks.

The hard ticks have the capitulum exposed and easily visible from the top view, and the upper side of the body bears a distinctly sclerotized shield or scutum. This structure covers most of the upper surface of the body in the male but is restricted to a much smaller area immediately behind the capitulum in the female. When a female becomes completely engorged with blood, her abdomen increases to many times its normal dimensions and the scutum will then appear to be extremely small in relation to the size of the body. Males do not become as large when engorged.

In the soft ticks, the body is a rather nondescript sac-like structure, the front portion of which extends forward past the base of the capitulum so that the capitulum is concealed when the tick is viewed from above. The soft ticks do not have a scutum on the upper side of the body, and the exoskeleton is rather leathery in texture and has the surface distinctly roughened.

Life Cycle and Habits

Ticks have 4 stages in their life cycle: egg, larva, nymph and adult.

Mating usually occurs while the adults are on the body of the host animal after which the female drops to the ground and deposits her eggs. Female hard ticks feed only once and lay one large batch of eggs which often contains as many as 10,000 or more. Some of the soft ticks feed several times and lay 20 to 50 eggs after each meal. Depending on such conditions as temperature and humidity, the eggs will hatch into larvae in from 2 weeks to several months.

Larvae, which are sometimes called "seed ticks," have only 6 legs. These larvae must attach themselves to a host to get a blood meal after which they usually drop to the ground, shed their skin, and emerge as 8-legged nymphs. Larvae of some ticks which feed on only 1 host remain on the host to molt. Because of the difficulty of finding a suitable host, larvae withstand long periods without feeding.

Nymphs resemble the adult in that they have 8 legs. They do not, however, have a genital opening. Like the larva, the nymph must be able to live without feeding for long periods of time until it finds a suitable host. After finding a host and feeding, the nymph molts and becomes an adult. Hard ticks have only one nymphal instar while soft ticks may have several. A few ticks, such as the cattle tick, *Boophilus annulatus* (Say), have only 1 host and molt on its body, leaving the host only to lay eggs.

Adult ticks may require several days' feeding before they are able to reproduce. The male hard tick usually dies soon after mating and the female dies after laying her eggs. The adult soft ticks are generally longer-lived, and egg laying is a periodic activity of the female.

Most ticks in all stages of their development spend a considerable portion of their life on or near the ground waiting for a suitable host animal. Most ticks will feed on a wide variety of animals with only a few feeding on but one kind. In some species, the immature stages will feed upon different hosts than do the adults. Reptiles and amphibians, as well as mammals and birds, may be parasitized by ticks.

Certain ticks carry the organisms of such diseases as Rocky Mountain spotted fever, relapsing fever, tularemia, and Texas cattle fever. Another threat to man which is posed by certain ticks involves a poorly understood condition called "tick paralysis." During the feeding process, the host may be afflicted with a paralytic condition which develops gradually and may result in death. The paralytic symptoms disappear rapidly upon removal of the tick and there seem to be no serious after-effects. Most of the tick problems which the pest control operator will encounter, however, are in and around homes and do not involve

the disease-carrying species. Only those species likely to be encountered by the pest control operator are described in this chapter. The pictorial key, Figure 11-G, will help identify other ticks to genus, and the student should refer to the selected references at the end of the chapter for identification to species as well as for more complete information on those which transmit disease.

HARD TICKS: Family Ixodidae

BROWN DOG TICK

***Rhipicephalus sanguineus* (Latrielle)**

This is one of the most widely distributed ticks in the world and there are records of its occurence on a number of hosts. By far the most common of these hosts in the domestic dog, and the brown dog tick is virtually restricted to this host in the United States. There are occasional records from man and from the domestic cat, but these are generally from instances in which there has been close contact with infested dogs. In other parts of the world, this tick seems to have a somewhat wider range of hosts. Under normal circumstances in North America, all feeding stages of the tick feed on dogs. The adults commonly attach to the ears and between the toes, and the larvae and nymphs are often found in the hair along the back. While these developmental stages are often found in these regions of the dog's body, they are by no means restricted to them and may be found on practically any part of the body.

When individuals of each feeding stage become fully engorged, they drop from the host and retire to some protected situation in the immediate surroundings. For this reason, all stages of ticks may be found behind baseboards, under window and door moldings, in window pulley openings, and in furniture.

They are frequently found outdoors in the southern part of the United States during any time of the year and are found outdoors during the warm months in the northern states. It is generally believed that this species cannot overwinter in the northern states unless it is within a heated structure.

AMERICAN DOG TICK

***Dermacentor variabilis* (Say)**

The dog is the preferred host of the adults of this species, but they will feed readily on many of the larger mammals. Larvae and nymphs of this species feed virtually exclusively on small wild rodents. Newly hatched larvae are yellow with red markings near the eyes while engorged larvae are slate-grey to black. Nymphs are similar in appearance to the larvae but have 4 pairs of legs. Adults are brownish in color and slate-grey when engorged.

This species is a vector of the causal organisms of Rocky Mountain spotted fever and is one of the species commonly involved with tick paralysis.

This is the most widely distributed tick of this genus in North America and is more commonly encountered by PCOs than are the other species. It occurs all over the eastern and central United States.

ROCKY MOUNTAIN WOOD TICK

***Dermacentor andersoni* Stiles**

As its common name suggests, this species is encountered throughout the Rocky Mountain region where it is the principal means of transmission of the causal agent of Rocky Mountain spotted fever. It is commonly found involved with cases of tick paralysis. Larvae and nymphs are generally found on small wild rodents, and the adults are found on larger mammals. Cases are known, however, in which all 3 of these stages have been found on medium-sized mammals such as jack rabbits.

While the PCO may not find this species to be a very common problem at present, it may become a more common problem if the present trend toward camping and vacationing in areas within its range should continue.

GROUND HOG TICK

***Ixodes cookei* (Packard)**

Both nymphs and adults of this species may attack man. They are most common in the New England states where they are found in summer cottages in areas frequented by ground hogs.

CONTROL MEASURES

In order to make it more difficult for ticks to get on the body, individuals walking in tick-infested country should avoid sitting on the ground or on logs in brushy areas. Repellents applied to socks and trouser legs will provide some protection; however, when in areas where ticks are numerous, a person should always examine his body twice each day and remove any ticks which may be present.

The only species which is at all likely to become established continuously in homes is the brown dog tick. This is due primarily to the fact that all feeding stages of this tick commonly feed upon the domestic dog, an animal which is often found indoors in dwellings.

In many parts of its range, the brown dog tick is resistant to many of the chlorinated hydrocarbon insecticides, and in such instances, sprays of 1% Diazinon, 2% malathion, or 1% ronnel are effective.

Infested bedding of pets should be carefully washed or disposed of by burning. The area around the bed must be sprayed thoroughly. Representatives of all stages of the tick life cycle can be found in cracks and crevices in the infested structures. Ticks can go without feeding for long periods of time, and the period which they may remain concealed in such places may sometimes be somewhat longer than the residual life of the chemicals used for control. For this reason, the effectiveness of a control program is usually dependent upon the thoroughness with which these areas are treated. The operator must be careful to treat such crevices using a solid stream nozzle to be sure that the toxicant is driven into the places in which the ticks are concealed.

Standard formulations of synergized pyrethrins are often added to the residual materials used in tick control. These are effective when they actually contact the ticks, and sub-lethal dosages often stimulate the ticks sufficiently to cause them to move about, making it more likely that they will encounter the residual materials.

Ticks are frequently present, particularly in the southern states, in lawns, shrubbery and under buildings. Heavy applications of DDT, benzene hexachloride, dieldrin, chlordane, or toxaphene give good control. These are applied either as dusts or as wettable powders at a rate of 3 to 4 pounds of actual toxicant per acre. The areas being treated must be thoroughly covered with the insecticide. Shrubbery up to a height of 2 to 3 feet should be sprayed. If the brown dog tick is the tick which must be controlled

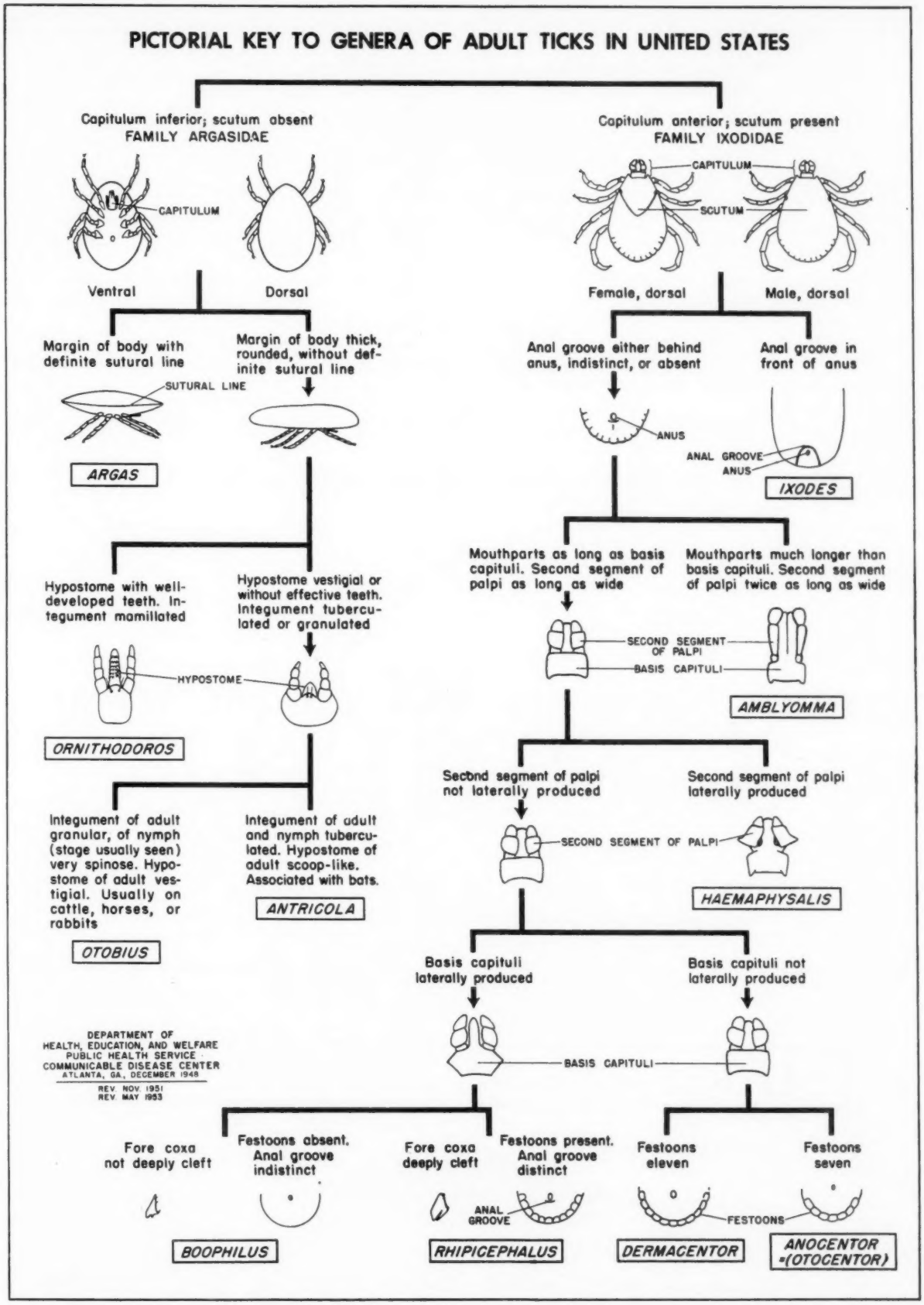

PICTORIAL KEY TO GENERA OF ADULT TICKS IN UNITED STATES
Capitulum inferior; scutum absent
FAMILY ARGASIDAE
CAPITULUM
Ventral
Dorsal
Capitulum anterior; scutum present
FAMILY IXODIDAE
CAPITULUM
SCUTUM
Female, dorsal
Male, dorsal
Margin of body with definite sutural line
SUTURAL LINE
ARGAS
Margin of body thick, rounded, without definite sutural line
Anal groove either behind anus, indistinct, or absent
ANUS
Anal groove in front of anus
ANAL GROOVE
ANUS
IXODES
Hypostome with well-developed teeth. Integument mamillated
HYPOSTOME
ORNITHODOROS
Hypostome vestigial or without effective teeth. Integument tuberculated or granulated
Mouthparts as long as basis capituli. Second segment of palpi as long as wide
SECOND SEGMENT OF PALPI
BASIS CAPITULI
AMBLYOMMA
Mouthparts much longer than basis capituli. Second segment of palpi twice as long as wide
Integument of adult granular, of nymph (stage usually seen) very spinose. Hypostome of adult vestigial. Usually on cattle, horses, or rabbits
OTOBIUS
Integument of adult and nymph tuberculated. Hypostome of adult scoop-like. Associated with bats.
ANTRICOLA
Second segment of palpi not laterally produced
SECOND SEGMENT OF PALPI
Second segment of palpi laterally produced
HAEMAPHYSALIS
Basis capituli laterally produced
Basis capituli not laterally produced
BASIS CAPITULI
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
COMMUNICABLE DISEASE CENTER
ATLANTA, GA., DECEMBER 1948
REV. NOV. 1951
REV. MAY 1953
Fore coxa not deeply cleft
Festoons absent. Anal groove indistinct
BOOPHILUS
Fore coxa deeply cleft
Festoons present. Anal groove distinct
ANAL GROOVE
RHIPICEPHALUS
Festoons eleven
Festoons seven
FESTOONS
DERMACENTOR
ANOCENTOR =(OTOCENTOR)

Figure 11-G. A pictorial key to genera of adult ticks in the United States.

in such situations, malathion or Diazinon wettable powder should be used.

SOFT TICKS: Family Argasidae

COMMON FOWL TICK

***Argas persicus* (Oken)**

This tick, known also as the chicken tick and the "blue bug," is a soft tick common in poultry houses in the southern and southwestern states. It may injure, even kill chickens, and may attack man. It can be controlled in chicken houses and bird roosting areas by the application of 1% malathion, 2% Chlorobenzilate, or 2% Kelthane.

RELAPSING FEVER TICK

***Ornithodorus* spp.**

This group of soft ticks which transmit the organisms of relapsing fever sometimes are found in buildings in the western and southern states. Control may be obtained with materials used for control of the fowl tick.

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Next Month: Miscellaneous Insects and Occasional Invaders

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- *IS EFFECTIVE UNDER HUMID CONDITIONS!*
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MOunt Vernon 8-1197

NPCA Convention Report

(*from page 24*)

Shuyler, Conservation Industries, Inc., Kansas City, Mo., dissected basic training for the completely new man. "It is necessary to train in the shortest time possible," he said, "and at the least expense."

Shuyler advocates devoting first workdays to company indoctrination, which would include orientation to company policies towards personnel, customers, and kinds of work. Attempt to build the company image and esprit de corps, and accent need for cleanliness, neatness, temperate language, politeness, promptness, as well as driving courtesy, Dr. Shuyler said.

Next, service indoctrination should be accomplished. This includes elements of pest identification, application of control measures, and safety factors. Equipment, material, and supplies should be explained, and actual projects, such as dismantling and reassembling a sprayer, should be undertaken. The serviceman should then be taught to prepare a water emulsion and oil solution, and to use them in the sprayer. Rodent bait studies are advisable, Shuyler went on, and some time should be devoted to reading and checking labels. Follow all this with a quiz, he advises.

Educating Present Employees

How to teach new ideas to present employees was the subject of James V. Benschoter, Ben-e-lene Exterminators, Toledo, Ohio. He contends updating older hands has three purposes: to improve customer service, to improve servicemen for faster, safer jobs, and to beef-up the profit picture.

Benschoter said staff briefing sessions should include several subjects, the first of which is service techniques with specific pest problems. Safety and correct use of chemicals, including new insecticides and rodenticides, and company policies should all be covered in regular sessions, he added. He suggested suppliers be called in to help with training sessions.

Marked Trucks Advertise

Cheapest advertising available to PCOs is marked trucks, Maurice Oser, Oser Exterminating Co., Denver, Col., told delegates in a Thursday morning roundtable on how to gain in industry stature. "For every dollar lost because people may attach stigmas to labeled vehicles, $50 in new business results," the '60-'61 NPCA president Oser reported.

To keep committee meetings moving, NPCA Technical Director Philip J. Spear could stop only a minute at any one of the half-dozen or so concurrent sessions on Wednesday morning, of one of the convention's most popular days.

Oser spoke from the floor after a panel of PCOs from around the country discussed public opinions of pest control. With Stanley McKenzie, of McKenzie Pest Control, Lake Charles, La., presiding, varied avenues of creating a public image were explored by the panel, coordinated by James W. Steckel. Steckel, who operates Torco Pest and Termite Control, Columbus, Ohio, led a forum which consisted of: Ernest P. Boland, Boland Pest Control Co., Inc., Athens, Ga.; F. Peter Clements, Clements' Pest Control Services, Ft. Lauderdale, Fla.; Truly Nolen, Jr., Phoenix, Ariz.; Harold Schnorrenberg, Dead Shot Chemical Co., Oklahoma City, Okla.; J. M. Keeney, Rose Exterminator Co., San Francisco, Calif.; J. C. Redd, Redd Pest Control Company, Inc., Jackson, Miss.; and Joseph A. Watkins, Vogel-Ritt of Michigan, Inc., Detroit, Mich.

Pest Control Week

Schnorrenberg believes a "Pest Control Week," such as he helped inaugurate this year in Oklahoma, is of great value in fostering favorable impressions among the public (PC, Aug., '61, pg. 46). Activities of the statewide observation included a two-mile parade of pest control equipment in Oklahoma City which, Schnorrenberg said, could not fail to arouse favorable opinion with the populace.

J. C. Redd emphasized the importance of creating a corporate image. Driving courtesy in marked vehicles and memberships for management in civic organizations are among Redd's public relations

devices. Several other delegates agreed on the usefulness of courteous operation of company vehicles to promote good will.

Vehicle Advertising Acceptable

Whether or not vehicles should carry company names occupied a major part of one discussion period. Robert C. Yeager of Rose Exterminator Co., Cincinnati, Ohio, revealed he had held back such labeling in the past, but is now beginning to identify his vehicles. Stigma of pest control in the home is passing, he maintains, and another PCO agreed that objections to such markings diminish in time.

"To utilize advertising to the nth degree, adopt some insignia which is repeated everywhere possible, on trucks, signs, and stationery," Truman Thomas suggested. Thomas, who operates the Anti-Pest Company, Inc., Shreveport, La., said a positive approach in advertising is needed. He advocated advertising a company as creators of healthy, clean environment, rather than as destroyers of animal life.

"Anything you do is advertising." Keeney told the group. "If trucks are marked, make sure they have topflight paint and lettering jobs, keep all vehicles clean and in top repair at all times, and instruct men to be shining examples of neatness and courtesy."

NPCA Has Busy Year

After opening ceremonies Monday, Dr. Ralph E. Heal, NPCA executive secretary, discussed activities to come. Included in future projects are sponsorship of a termite research symposium, planning a vertebrate pest conference, and backing a health and safety program. Heal described the latter as the most important investigation the industry has had for years.

Heal revealed participation in the association's Insured Warranty Program for certifying lack of infestation or damage after termite jobs, has not reached the quantities necessary to continue as originally planned. Unless increased activity is noted soon, the present price to members will have to be raised, he warned.

Working with Heal in arranging the convention and keeping it on a smooth track were Richard L. Lewis, Orlando, Fla., chairman of the national committee, assisted by G. Darrell Cardiff, Santa Cruz, Calif., and James W. Steckel, Columbus, Ohio. Chairman of the Florida committee was F. Peter Clements, of Ft. Lauderdale. Ladies' activities were directed by Mrs. William Clements, Leesburg, Fla., and Mrs. Truly Nolen, Miami.

Houghton, Adams, Schendel Elected Official Team for '62

A spirited election at the close of this year's meeting elevated two '61 officers and selected a seasoned PCO to hold the three top NPCA elective posts for the coming twelve months. New president is Charles W. Houghton of Safety Fumigant Co., Boston, Mass. Executive vice president is now Paul K. Adams who runs Adams Pest Control Inc., Alexandria, La., and secretary-treasurer for the '61-'62 period is Robert R. Schendel, Schendel Pest Control, Inc., Topeka, Kans. This will be Schendel's first year on the official board.

As delegates wound up business in Miami Beach, their attention was directed toward picking a convention site for 1966. New Orleans won out over several other cities which extended an invitation for the annual conclave. Next year, the NPCA will convene at the Muehlebach Hotel in Kansas City, Mo., October 14-18.

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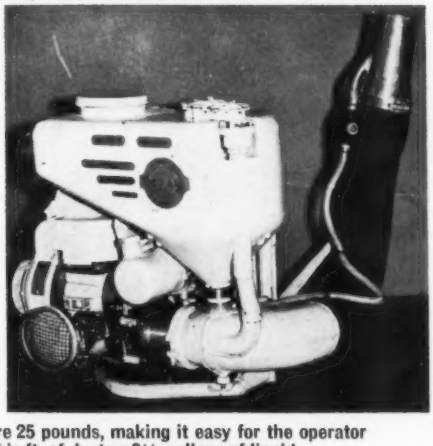

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Shortcomings in Termite Control Work in Florida

by F. R. DUCHANOIS

Entomologist, Florida State Board of Health, Tallahasse

An understanding of the elementary habits of subterranean termites is the basis for preventive-control principles and practice and for the minimum performance standards suggested in this paper.

It should be noted with care that minimum procedures are the least acceptable, not the most acceptable, measures indicated for the accomplishment of a task at hand — whether it be prevention and/or control of termites, or anything else. They are the bare objectives which when taken as a whole and applied together can reasonably be expected to result in the effective prevention or elimination of a termite infestation.

If the circumstances at hand, for one special reason or another, should indicate that the objective of prevention and/or control cannot reasonably be expected, then the suggested procedures are no longer minimal, or least satisfactory, but become subminimal and unsatisfactory. In this case, it is the responsibility of the certified operator and the serviceman to augment or supplement the procedures in such a manner that they become "minimum," "satisfactory" and adequate for the job.

The objection often raised is that such things as minimum standards choke the initiative and stifle the PCO's independence and freedom of action and eventually lead to greater and greater restrictions. It is true that "there is more than one way to skin a cat" — usually, but not always. The man who insists on removing a right-hand threaded bolt by turning it clockwise, or the one who stubbornly refuses to accept the fact that a square bung will not fit a round bung hole, is usually a thoroughly bewildered, confused and frustrated individual. The surgeon who plies his skill in the absence of aseptic conditions is doomed to failure. The point is, that in these examples, and countless others that can be cited, there is in certain respects no room for freedom of action. You either go about the job in a certain way or it doesn't get done.

We will admit that there are two sides to every coin, but we are also equally as certain that a bent coin will not go in the slot no matter to which side it is turned. By the same token and logic and on the basis of our present knowledge, there are certain procedures which are undeniably and incontestably essential to every subterranean termite prevention or control job that was ever done or ever will be done if you can honestly and reasonably expect and hope to stop the termites successfully. You know this and I know it, but the fact remains and the record shows that the industry in Florida has not yet been able to adopt a code of sound principles for controlling termites.

One other thing I should make clear — these remarks are not to be construed as a hue and cry for so-called minimum standards, and no claim is made for perfection.

I am thoroughly convinced of the need of the essential character of the few procedures I am suggesting for the performance of subterranean termite control work. There is nothing new or startling about this. The only startling thing to me is the complacency of the industry in Florida in tolerating for as long as it has some of the shoddy, substandard so-called termite control work foisted on the public from time to time. Even though your individual standards may equal or exceed those outlined here, the failure on the part of your competitor to provide such work standards reflects directly or indirectly, sooner or later, on you and the industry as a whole. Over the long pull, you suffer from lack of the general public acceptance, confidence and trust. Whether such performance standards should be self-imposed industry-wide in some way, or state-imposed, is not for me to say.

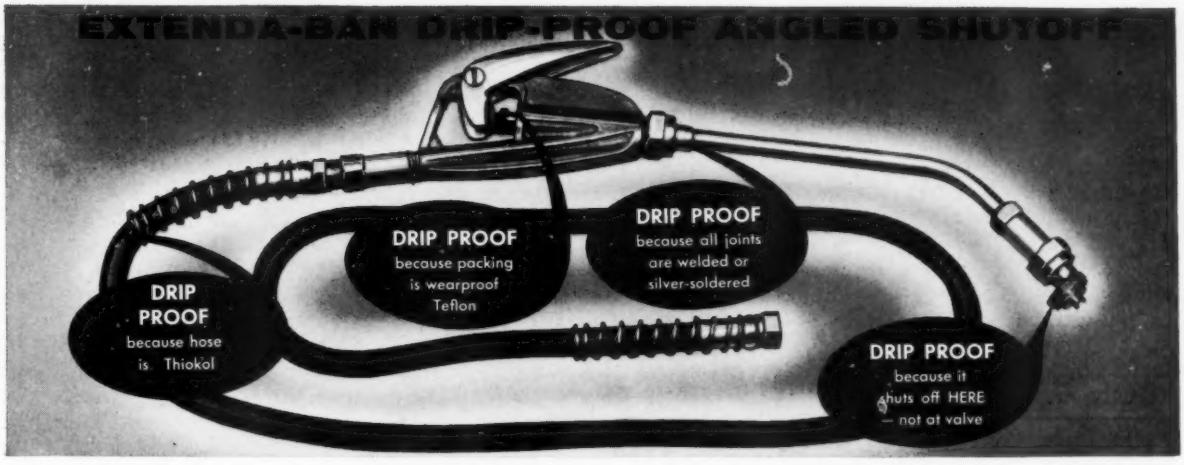
Before going into what we consider should be the least attainable procedures commensurate with expected effective prevention and control, let us consider for a moment some various frequently occurring items which can be classified as shortcomings, deficiencies, causes for control failure, violations, or what have you.

Passé Soil Poisons

For one thing, pentachlorophenol, orthodichlorobenzene, coal-tar creosote, trichlorobenzene, and similar aromatic hydrocarbons, although acceptable for use as wood preservatives and fungistatic agents, are not generally recommended for use as soil poisons. They are *passé*, outmoded, obsolete for this purpose for the simple reason that laboratory and practical field research has shown that they do not hold up as well, or have the control life that some of the newer insecticides do. I have personally observed that some job failures are a result of the use of these materials.

"Clearances" Must Be Meaningful

Another fairly common practice has many unhappy repercussions for the operator. That is the issuance of a clearance letter on a structure undergoing change of ownership on the basis of spot or partial treatment. We take the position that, at least from the moral and ethical viewpoints, a clearance letter should mean something. It should have good foundation for meaning just what it says. Either the inspection should be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negative and treatment is not indicated, or it should be positive or presumptively positive and complete treatment is recommended. In the latter case, presentation of the letter of clearance would be based upon complete treatment or otherwise withheld. If the property owner wants a preventive treatment, well and good, but if there are no termites he should be told so.

Enforcement Without Bias

Another misconception or mistaken notion which seems to rear its ugly head from time to time is that of questioning the motives of State Board of Health enforcement inspectors. There are still some who are of the completely irresponsible opinion that our inspectors are partisan, or show favoritism, or are discriminatory in some cases. To this charge I can only say that whether you operate as ABC or XYZ Pest Control, we make every effort humanly possible, with the available enforcement staff, to enforce the law and the rules without bias or slant. And I pledge to you the law shall be enforced impartially.

The State Board of Health has adopted the policy of first warning the operator or licensee in writing of all minor violations brought to its attention. Failure to heed this warning will result in the same violation being reported to the State Health Officer and the Commission for action. Major violations will unhesitatingly be reported to the State Health Officer and the Commission and, in addition, an affidavit for arrest filed in the appropriate court of law. This policy is no more nor less than the law prescribes, and the least that can be said for it is that it is not wishy-washy.

"Active Infestation" Defined

Something else which I should like to bring to your attention is the fallacy of reporting *active infestations* to property owners or clients on the basis of presumptive, questionable and/or unsubstantiating evidence or, worse yet, no evidence at all. This is clearly prohibited by the law and rules. More importantly, however, the opposite is dictated by the most fundamental concepts of business morality and ethics and personal conscience. A structure as defined in the law is infested or infected only when it has living, active organisms therein.

Inventory Your Methods

Some operators and licensees are living in a fool's paradise. These individuals seem to revel in the feeling of false security that comes over them, or I should say that overcomes them, from not having been caught in violations, or in doing slipshod, substandard work.

Sooner or later, in one way or another, inadequate, ineffective, and especially negligent so-called structural pest control work catches up with the sharp operators. Don't be one of them. Take a hard look at your own practices and if the shoe fits wear it. If it doesn't, try it on for size. And one last thing—just because you don't have complaints pouring into your office — or ours — doesn't necessarily mean you are complying with the law and rules.

Drywood Fumigation Favored

Turning our attention for a moment to drywood termites, we find the same old pot boiling over the question of fumigation versus spot treatment or needling. Prac-

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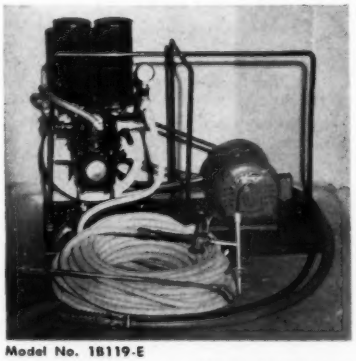

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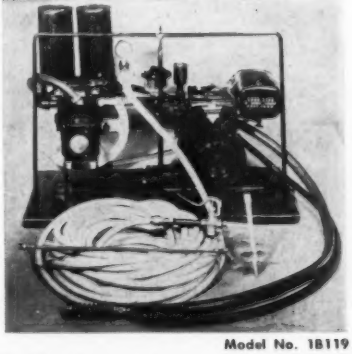
Model No. 1B119 (right) same as electric-powered model, except is powered by heavy duty 2½ HP, 4 cycle, air-cooled **gasoline** engine. Weight approx. 144 lbs.



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9/32 - 4	1.33	2.66	3.33
9/32 - 6	1.33	2.66	3.33
5/16 - 4	1.40	3.33	4.00
5/16 - 6	1.40	3.33	4.00
3/8 - 4	1.53	3.73	4.40
3/8 - 6	1.53	3.73	4.40
7/16 - 4	1.73	3.86	4.54
½ - ¼ sk	2.00	4.00	4.67
½ - 3/8 sk	2.00	4.00	4.67
9/16 - 6	2.26	4.40	5.06
5/8 - 6	2.40	4.66	5.34
¾ - 6	3.07	4.86	5.54
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tically speaking, there should be no doubt whatever by this time that general space fumigation is more effective in accomplishing certain and complete control of drywood termite infestation in a structure than any other method now in use. This is so for the simple reason that it is practically impossible to determine the degree or extent of a drywood termite infestation in inaccessible locations from visual and manual inspection methods now available. It's like trying to find the light switch in a strange, dark room. Just because you can't find it doesn't mean it isn't there.

A spot treatment is a spot treatment whether you treat one or a million spots. Nevertheless, nonfumigators should not despair since they are permitted to spot treat for control of drywood termites when done in accordance with the rules governing such treatments, which simply say to call a spot treatment a spot treatment and be done with it.

Florida's Minimums

Here are our suggestions for minimal prevention and control procedures for subterranean termite control. We have purposely avoided going into architectural features and designs and construction practices which, of course, are extremely important insofar as these prevent or discourage subterranean termite attack and damage. And it is not meant to imply that our suggestions are a substitute for, or replacement of, good design and construction.

1. *Structural Sanitation*

(a) Remove all wood debris, loose lumber, stumps, large exposed roots and other cellulose-containing material from beneath and, insofar as practical, from against the structure.

(b) Remove all temporary structural wood in contact with the soil including exposed form boards, grade stakes, wood blocks or supports from beneath and, if practical, from against the structure.

(c) Remove and if necessary replace with impervious material all structural wood *contacts* with the soil, including but not limited to porch steps, latticework, posts, door jambs, etc.

(d) Recommend and at the option of the property owner install or provide adequate substructural drainage and/or ventilation to correct any deficiencies. It is recommended that vent openings through the foundation have a net unobstructed area equal to 2 sq. ft. for each 100 linear ft. of outside perimeter wall plus ⅓ sq. ft. for each 100 sq. ft. of crawl-space surface area. Another way to express this roughly is to provide vent openings with a net unobstructed area equal to 1/160th of the ground area.

2. *Soil Treating with Chemicals*[1]

Note: Soil chemicals have demonstrated their effectiveness and reliability in safeguarding wood in buildings from termite attack for a period of over 10 years, according to the results obtained from tests conducted by the U. S. Forest Service. On the basis of present information, it appears likely that even longer periods of protection can be anticipated when the chemicals are properly applied about the foundation walls, piers, and the surface of soil that is to be covered with concrete slabs.

3. *Approved Chemicals and Concentrations Arranged Alphabetically*

(a) Aldrin,[2] 0.5%

(b) Benzene hexachloride,[2] 0.8% gamma isomer (Lindane)

(c) Chlordane,[2] 1%

(d) DDT,[3] 8%

(e) Dieldrin,[2] 0.5%

(f) Heptachlor,[2] 0.5%

4. *Treatment Procedures and Rates of Application*

(a) Off-grade or crawl-space structures[4]

(1) Thorough inspection and evaluation

(2) Trench and treat the soil along the inside of all foundation walls and other critical locations, such as around piers, pipes, utility entrances, around fireplace, chimney, and flue bases, and similar construction. Apply finished chemical at the rate of 2 gallons per 5 linear feet.

(See below for trenching procedures.)

(3) Trench and treat the soil along the outside of all foundation walls, including the part opposite (adjacent to) entrance platforms, porches, planters, and other similar construction. Apply finished chemical at the rate of 2 gallons per 5 linear feet per foot of depth from finished grade to top of footing.

Trenching: Normally, trenches are about 6 to 12 inches wide and 6 to 15 inches deep for shallow footings, or to the top of, but not below, the foundation footing for deep footings. In some instances soil drilling or punching to the top of the footing, at 1 to 2-foot intervals, is done in connection with trenching for deep foundations.

(4) Under filled, attached porches, entrance platforms, utility entrances, and similar construction having a covering concrete or impervious slab, apply chemical at the rate of 1 gallon per 10 square feet. Drill (rod) and/or excavate and/or trench, and treat along the interior foundation walls of all filled or unfilled attached porches, entrance platforms, and other similar construction. Apply chemical at the rate of 2 gallons per 5 linear feet. Where fill is broken and excavated, adjust treatment accordingly.

(5) Drill and treat all voids of unit masonry walls, including partition walls, stoops, piers, chimney, fireplace, and flue bases, and similar construction. Apply chemical at the rate of 1 gallon

(*Continued on page 55*)

1. We are indebted to the Division of Forest Insect Research, Forest Service of the U. S. Department of Agriculture for the information which largely forms the basis for these suggestions.
2. Apply as an oil solution (not heavier than No. 2 fuel oil or equivalent) or as a water emulsion.
3. Apply as an oil solution only (not heavier than No. 2 fuel oil or equivalent).
4. Applicable with little or no variation to both pre-and post-treatments.

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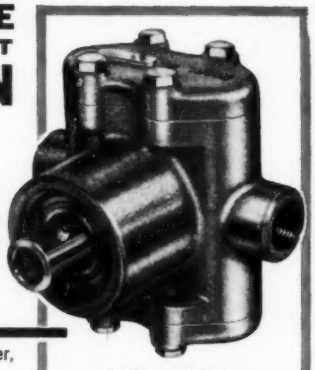

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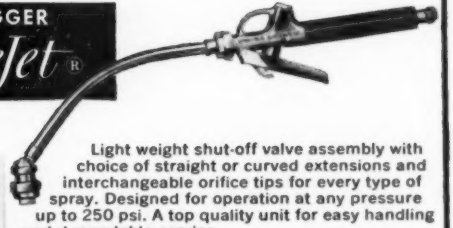

Light weight shut-off valve assembly with choice of straight or curved extensions and interchangeable orifice tips for every type of spray. Designed for operation at any pressure up to 250 psi. A top quality unit for easy handling and dependable service.

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What's NEWS In The Industry

New Federal Review Board to Keep Tab on Pest Control

A New Federal Pest Control Review Board was recently set up to carry out policies presented to Congress by President John F. Kennedy in his special message on natural resources.

Establishment of the board was jointly announced by the Departments of Agriculture, Defense, Interior, and Health, Education, and Welfare.

Kennedy stressed a need for coordinated effort by Federal agencies in pesticide control programs. This singleness of purpose is designed to insure proper service of national interests, including public health, agriculture, and wildlife conservation.

Duties of the new panel will include examination of pest control programs as well as advice to various government departments and agencies concerning problems in use of pesticides and other chemicals, especially in cases involving inter-departmental interests and responsibilities.

Goal of the Board is to insure effective, economical, and safe pest control procedures. Special attention will be given problems arising from pesticide uses that involve possible hazards to human health, to livestock and crops, and to fish and wildlife.

Secretaries of the four departments participating each named two members. From Secretary Ribicoff's Department of Health, Education, and Welfare will come Dr. Robert J. Anderson, Public Health Service, and J. K. Kirk, Food and Drug Administration. Brig. Gen. O. B. Kendrick, U. S. Army, and Capt. Richard T. Holway, U. S. Navy, will represent the Department of Defense. Robert Paul and Lansing Parker are from the Department of the Interior, and the Department of Agriculture will have Dr. W. L. Popham and W. S. Swingler.

Dr. Anderson will serve as Chairman of the Board.

'62 Tri-Staters to Jekyll Isl.

Georgia is to be host for the 4th annual Tri-state Pest Control meeting, tentatively scheduled for the week of August 19, 1962. Jekyll Island has been selected as site for this yearly business and fun summer convention attended by PCOs and their families from Georgia, North Carolina and South Carolina.

Fifty delegates attended 15th annual Iowa PCA Meeting at Hotel Tallcorn in Marshalltown, Sept. 28-29. Among participants were (l to r): Fred Michils, honorary member, St. Hawthorne, Calif.; IPCA treasurer Wayne Cummings, Bug-X-Co., Davenport; NPCA president Maurice Oser, Oser Exterminating Co., Denver, Colo.; Dr. Harold Gunderson, extension entomologist, Iowa State College, Ames; IPCA president Earl Carr, Presto-X-Co., Omaha, Nebr.; and William Schendel, Modern Pest Control, Marshalltown, association secretary and convention chairman.

Three NYC PC course planners (l to r): Harry Gair, President, New York Exterminating Institute; Lawrence Jarvie, President, New York Community College; and A. E. Abrahamson, Director, Bureau of Sanitary Inspection, NYC Health Dept.

First NY Pest Control Course Attracts 116

New York City's first pest control course received an apparently vigorous vote of confidence by enrolling 116 for a 15-week term comprised of Tuesday night or Wednesday afternoon sessions at New York Community College, Brooklyn (PC, Sept. '61, pg. 50).

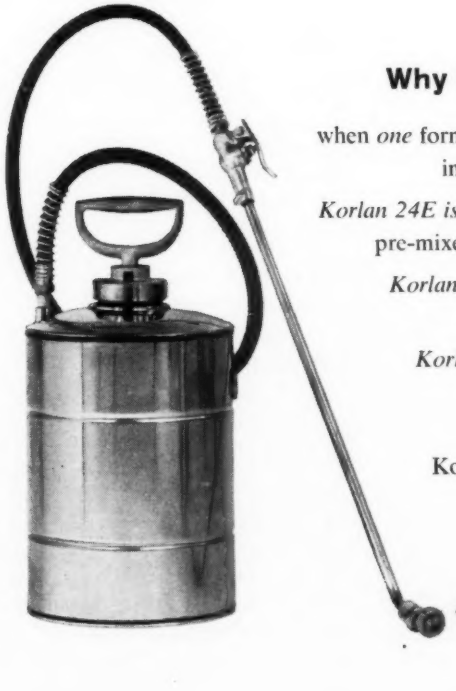
Registrants include 81 representatives of pest control firms, 9 New York City civil service personnel, 5 real estate managers, 2 hotel managers and 19 others, including undergraduates. This enrollment shows greater interest than was originally anticipated, according to Richard Klemfuss, executive secretary of the Exterminating Industry Institute, Inc., New York association which, along with Community College and the New York City Health Department, co-sponsors the class.

Klemfuss said the course should provide industry with a well-trained labor pool. "Unquestionably, the public will benefit and most likely the economic structure of the pest control industry will increase to a more sophisticated level," he added.

Tell Health Board of Food Jobs, Indiana PCA Advised

PCOs should inform public health authorities when they treat food establishments, Indiana State Board of Health official Karl Jones told delegates to the second annual Indiana Pest Control Operators Association meeting September

ENDS STOCK DUPLICATION . . . "LEFT-OVER" PROBLEMS!



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Korlan 24E is 100% oil soluble! And in deodorized kerosene, it is so stable it can be pre-mixed and stored for future use with no fear of deterioration or separation.

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Korlan 24E is powerful! It kills resistant strains of flies, bedbugs, roaches—even the German roach! And its residual action lasts up to six weeks, reducing your "call-back" problems.

Korlan 24E won't stain painted or whitewashed walls, or leave a lingering odor either. Call your nearest Dow sales office for full information.

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THE DOW CHEMICAL COMPANY DOW Midland, Michigan

12, 13 at Indianapolis' Lincoln Hotel.

Jones emphasized that food and other products could be considered adulterated if premises were found infested or if toxicants were present.

In busy two-day session, PCOs of the Hoosier state heard Dwight Shelbourne of the Indianapolis Better Business Bureau underline the importance of ethics, and listened to a discussion of DDVP given by V. S. Shutt of Shell Oil Company. Poison bait preparation was examined by Galen C. Oderkirk, district agent of the U.S. Fish and Wildlife Service at Purdue.

Second day of the meeting found Dr. Ralph E. Heal, executive secretary of the National Pest Control Association, urging delegates to take a new look at safety.

The mushrooming complexity of entomology was stressed by Dr. John V. Osmun, head of Purdue's Entomology Department.

The Indiana group, which convenes twice yearly, will meet next in March at Purdue in Lafayette.

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Notebook

TIPS AND IDEAS FROM THE FIELD

"Taxus" Rats

by ARTHUR W. GIBSON

Vogel-Ritt of Ohio, Cincinnati

Recently we have had a number of rat infestations around private homes in the better areas of Cincinnati. These homes have built-in garbage disposals and all trash is kept in covered cans inside the garage for pick-up.

The rats harbor under a slab or patio, but we were at a loss when it came to figuring out what their food supply was. We eliminated bird and squirrel feeders, which might be a source of food, but the rats continued to thrive. Finally, by getting the housewife to keep an eye out for us, we determined the rats were eating the small red berries off the shrubbery around the house. They seem to like one particular shrub called "Taxus," which resembles the Barberry. We also found the rats were getting all the water they needed from private backyard swimming pools in the area.

A program of dusting the burrows with Calcium Cyanide "A" dust and aldrin 25-W, 50-50 by volume, and placing *locked* bait boxes containing anticoagulant rodenticide around the outside of buildings where children and pets would not have access to them, was initiated and the infestation was eliminated.

Next time you have a rat puzzler around garbage disposals, check nearby bushes as a possible source of food for the rodents.

Suppliers Staff Changes

Michigan Chemical Corp.'s appointment of George J. Coleman, Jr. as product manager of industrial chemical sales was recently announced. He will maintain his offices at the company's New York address: 230 Park Ave.

Wood Treating Chemicals Company's Board of Directors met recently to elect C. F. Grafton vice president. Grafton, who joined the company a year ago as regional manager, will have offices in Memphis, Tennessee, where he will direct the firm's activities in the South.

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Infestation Report

Contains pertinent portions of the Department of Agriculture's Cooperative Economic Insect Report, material from university entomology departments and reports from readers. PCOs noticing infestations in their own areas are urged to communicate with *Pest Control* so their information may be added to this infestation report.

IMPORTED FIRE ANT
(*Solenopsis saevissima richteri*)

Florida: Collected in Peace River Park east of Bartow, Polk County. First infestation in county outside of nursery sites.

CARPET BEETLES

California: Several species numerous in homes throughout state.

A HAIRY FUNGUS BEETLE
(*Typhaea stercorea*)

Pennsylvania: Appeared in grain in barns and milkhouse in Elk and Clearfield counties.

SAW-TOOTHED GRAIN BEETLE
(*Oryzaephilus surinamensis*)

Colorado: Infested stored food in home in Westminster, Adams County. **North Dakota:** Heavy infestation locally in Hettinger County. **South Dakota:** Damaged stored grain in Spink County. **Wyoming:** Infested stored grain and caused considerable damage in silo near Laramie, Albany County.

STRAWBERRY CROWN BORER

South Dakota: Nuisance in homes in Meade and Edwards counties.

A BOSTRICHID
(*Stephanopachys substriatus*)

California: Medium infestation in Philippine mahogany woodwork in residence in San Diego.

CHIGGERS

Pennsylvania: Very abundant and annoying in Lancaster County.

CRICKETS

Indiana: *Nemobius* spp. more abundant and causing greater nuisance around homes since 1959. **Pennsylvania:** *Acheta* spp. appeared around homes in Centre County.

A FIELD CRICKET
(*Gryllus* sp.)

South Dakota: Numerous and bothersome in homes in eastern area.

EUROPEAN EARWIG
(*Forficula auricularia*)

Utah: Severely notched hedge, peony and lilac leaves locally in Logan. **Nevada:** Heavy infestations with moderate damage to home gardens in Lee area, Elko County. **Colorado:** Appeared on peach tree in Aurora, Arapahoe County.

CAT FLEA
(*Ctenocephalides felis*)

California: Heavy populations invaded commercial store in Lake Cachuma, Santa Barbara County, and several homes in Sacramento.

BLACK FLIES

Utah: Abundant and annoying humans locally in Weber Canyon, Weber County.

HOUSE FLY

Rhode Island: Late summer populations caused annoyance in homes throughout the state. **South Dakota:** Continued a pest in eastern areas.

MARCH FLIES

Alabama: Extremely heavy populations of undetermined species in Mobile, Tuscaloosa, and Greene counties.

A MIDGE
(*Chironomus crassicaudatus*)

Maryland: Very heavy infestation occurred in Sassafras River vicinity.

NORTHERN FOWL MITE
(*Ornithonysses sylviarum*)

Virginia: Infested apartment house in Pulaski.

CASEMAKING CLOTHES MOTH

North Dakota: Many cases with most adults emerged collected from stored bobcat and beaver pelts at Columbus, Burke County.

BLACK WIDOW SPIDER
(*Latrodectus mactans*)

Nevada: More abundant than usual in southern Washoe County. **Utah:** Caused concern around homes at Logan, Cache County, and at Layton, Davis County. Woman hospitalized due to bites at Provo, Utah County. **Colorado:** Numerous in Montezuma County.

BROWN DOG TICK
(*Rhipicephalus sanguineus*)

California: Heavy infestations locally in yards and kennel in Sacramento. **Maryland:** Infested homes locally in Baltimore and Queen Anne counties.

VESPIDS

North Dakota: Home and yard infestations of yellow jackets reported in eastern section. **Utah:** Yellow jackets annoying about several Logan and North Logan homes. Entered homes and schoolrooms at Salt Lake City. **Wisconsin:** Yellow jackets and hornets (probably *vespula maculata*) created nuisance in several areas of state. Tourists and campers driven away in Douglas and Bayfield counties.

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Grains Exude Anti-Insect Vapor

Insectiseed, a new outdoor repellent that allegedly provides 24-hour protection against gnats, mosquitoes, sand fleas and other biting insects, has been introduced by ChemSpex, Incorporated, St. Petersburg, Fla. Toxicant in the new product is DDVP.

In granular form, Insectiseed can be hand-scattered like grass seed. It produces an odorless vapor, without fog or spray, that repels insects yet is not noticeable by humans, according to ChemSpex.

Equal success was reported in protecting picnic areas, swimming pools, lawns, yards, and camping grounds against insects.

Registered with the United States and Florida departments of agriculture, Insectiseed is available in 1½-pound bags, each sufficient to treat 3,500 square feet, the manufacturer says.

For prices and details, write the ChemSpex Company, P. O. Box 10758, St. Petersburg, Florida.

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Calendar

Missouri PCO Short Course, University of Missouri, Student Union Bldg., Columbia, Nov. 6-7.

University of Florida PCO Short Course, Gainesville, Nov. 6-8.

Mosquito Control Training Course, Communicable Disease Center, Atlanta 22, Ga., Nov. 6-10.

V. P. I. PCO Short Course, Virginia Polytechnic Institute, Blacksburg, Nov. 8-10.

Professional Pest Control Assn. of Dallas County Monthly Meeting, El Chico Restaurant, Nov. 9, 7 p.m.

Maryland Pest Control Assn. Monthly Meeting, Lord Baltimore Hotel, Baltimore, Nov. 15, 6:30 p.m.

Nebraska Assn. of Pest & Termite Control Operators, Inc. Annual Meeting and Short Course, Town House Motel, Omaha, Nov. 16-17.

Texas Pest Control Assn. Annual Convention, Fairway Motel, McAllen, Nov. 16-18.

Washington, D. C. Pest Control Assn. Meeting, 4909 Wisconsin Ave., N.W., Nov. 20, 8 p.m.

Pest Control Assn. of South Florida, Monthly Meeting, Lindsey Hopkins Vocational School, Miami, Nov. 27, dinner 6:45 p.m., meeting 8 p.m.

Entomological Society of America 9th Annual Meeting, McAllister Hotel, Miami, Fla., Nov. 27-30.

Hawaiian Pest Control Assn. Monthly Meeting, Reef Hotel, Honolulu, Nov. 28, 7 p.m.

Ohio Pest Control Assn. Annual Meeting, Commodore Perry Hotel, Toledo, Nov. 29-Dec. 1.

Chemical Specialties Manufacturers Assn. 48th Annual Meeting, Roosevelt Hotel, New York City, Dec. 4-6.

Illinois Pest Control Management Workshop, University of Illinois, Urbana, Dec. 5-8.

Pennsylvania Pest Control Assn. (Eastern Div.) Election Meeting, Shoyer's Restaurant, Philadelphia, Dec. 14.

PCOs of California, Inc. Cal-Poly Conference, Cal-Poly Institute, Pomona, Dec. 16.

Southern PCO Conference, Monteleone Hotel, New Orleans, La., Jan. 15-17, 1962.

Maryland Pest Control Assn. Election Meeting, Lord Baltimore Hotel, Baltimore, January 17.

Arizona Pest Control Assn. 3rd Annual Seminar and Election Meeting, University of Arizona, Tucson, Jan. 19-20.

26th Annual Purdue PCO Conference, Purdue University, Lafayette, Ind., Jan. 22-26.

Eastern PCO Conference, University of Massachusetts, Amherst, Mass., Jan. 24-26.

Hercules Offers Pest Bulletins

Eight recent bulletins concerning life cycles, damage, and control of economically important insect pests are now available as a packet from Hercules Powder Company.

Bulletins cover army worms, fall army worms, cutworms, grasshoppers, lygus bugs, potato leaf hoppers, sugar-beet webworms, and stink bugs, and can be obtained from the company's Agricultural Chemicals Division, 910 Market St., Wilmington 99, Del.

Hub States' "News"

A series of 4-page "PCO News" pieces has been started by Hub States Chemical & Equipment Co., 1255 N. Windsor St., Indianapolis, Ind. to promote its line of products, as well as provide selected items of general interest. You can be put on the mailing list to receive these publications by writing Hub States.

Bryan Auer, Hub States' president, says he plans to feature news about and from PCOs. The first two issues are presently available to *PC* readers.

Fla. Termite Work Shortcomings

(*from page 46*)

per 5 linear feet applied as nearly as practicable at, and from grade to, footing. Where voids are exposed and unobstructed at top of foundation down to top of footing, vertical treatment without drilling is permissible.

(b) On-grade (or ground) or slab-type structures

(1) Pretreatment

(aa) Inspection and evaluation

(bb) Where the fill is soil or unwashed gravel, apply 1 gallon per each 10 square feet of soil surface as an over-all treatment prior to pouring of the slab, which may serve as a floor, attached porch, terrace, Florida room, breezeway, entrance platform, or a similar purpose.[5] Where the fill is washed gravel or other coarse, absorbent material, such as cinders, increase the application to 1½ gal. per 10 sq. ft.

(cc) Apply chemical at the rate of 2 gallons per 5 linear feet to critical areas, where subterranean termites frequently enter, such as at expansion joints along the entire inside foundation walls, including both sides of interior partition bearing walls, around utility and service entrances (plumbing), bathrooms, and similar locations.

(dd) Apply chemical at the rate of 2 gallons per 5 linear feet along the entire exterior foundation walls from grade to top of footing after all grading is completed.

(ee) Treat all voids of unit masonry construction, including foundation walls, bearing partition walls, and similar locations by applying 1 gallon of chemical per 5 linear feet. Behind filled porches and entrances to buildings, the wall voids should be treated to the top level of the concrete slab.

(2) Treatment of existing structures

(aa) Inspection and evaluation

(bb) Drill and treat all voids of unit masonry perimeter walls, including all off-set construction. Treat by applying chemical at the rate of 1 gallon per 5 linear feet.

(cc) Trench around entire outside perimeter foundation walls including areas around entrance platforms, attached porches, garages, planters, and similar construction. Treat by applying chemical to trench at the rate of 2 gallons per 5 linear feet from grade to footing.

(dd) Drill horizontally and basally through and parallel to foundation walls at corners of structure, and rod beneath slab to treat along all interior foundation walls, (to prevent access at footings, vertical cracks, expansion joints), including along both sides of or below partition walls, area beneath bathrooms, and other critical areas beneath slab. Alternatively, drill horizontally, basally, and perpendicularly through foundation walls, and rod ("short-rod") beneath slab at 1 to 3-foot intervals; or drill vertically and parallel to the interior foundation walls and partition walls from within the structure, and rod and treat at 1 to 3-foot (preferably 12 to 15 inch) intervals. In all cases, apply chemical at the rate of 1 to 2 gallons per 5 linear feet or as practicable.

(ee) In all foregoing instances of drilling, reseal all openings with mortar or equivalent.

5. Oil solutions should not be applied under slabs in situations where they may damage vapor-barrier materials, etc.

Federal Aid for Kansas Study

A Public Health Service grant for Kansas State University research into the effects of environment on stored products insects recently was renewed for the fifth consecutive year.

Nearly $40,000 has now been made available by the government agency for evaluating such factors as temperature in grain mass, moisture content of grain, and the effect dockage has upon development and behavior of various stored grain insects.

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Classifieds

When answering ads where box number only is given, please address as follows: Box number, c/o Pest Control, 1900 Euclid Avenue, Cleveland 15, Ohio.

Rates: "Position Wanted" 5c per word, minimum $2.00. All other classifications, 10c per word, minimum $2.00. All classified ads must be received by Publisher the 10th of the month preceding publication date and be accompanied by cash or money order covering full payment.

HELP WANTED

IF YOU ARE qualified to take complete charge and manage a branch office of a well established corporation and have a Florida Certificate in G. R. T. (guaranteed income) reply to Box 609, Pest Control magazine.

CAREER OPPORTUNITIES in Bruce-Terminix organization for men trained in termite and pest control management, sales or service, sanitation, fumigation, etc. Write personal qualifications, preferred locations and personal references to Manager, Terminix Division, E. L. Bruce Co. (Incorporated), Memphis 1, Tenn. All inquires held strictly confidential.

WE HAVE need for a recent graduate who is qualified to inspect and make recommendations to the management regarding industrial plant sanitation and pest control procedures. Ability to work cooperatively with plant personnel at all levels is very important. Send resume and recent photograph to Box 612, Pest Control magazine.

TECHNICAL DIRECTOR. An important position for outstanding man with chemical background and well-rounded knowledge of insecticides, fumigations and materials used in pest control work to head service department of a large pest control company located in a large eastern city. An important position for a man with experience, sales ability and capable of handling servicemen and customers and possessing managerial ability. This is an unusual opportunity for the right man. Remuneration to meet expectations plus many fringe benefits. Must be available immediately. All replies strictly confidential. Submit account of academic and professional training, past employment, earnings, photo and any other pertinent facts to Box 608, Pest Control magazine.

MANAGERS for branch offices. Rapidly expanding pest control firm requires men to manage offices. Must have initiative, sales ability and forcefulness. Excellent opportunity to become associated with progressive organization enjoying solid financial position. Salary and percentage. Submit complete data: age, education, experience, and other pertinent details, together with photo. All replies confidential. L. L. Crosby, President, Commonwealth Sanitation Co., 3506 Bigelow Blvd., Pittsburgh 13, Pa.

FOR SALE

ESTABLISHED FIRM in Southwest since 1952. General corporate name. Good reputation. Reason for sale, family health situation. Box 610, Pest Control magazine.

OPPORTUNITY, long established, well conducted one man business, N. Y. City area. Asking $12,000 — Experienced owner willing to remain part-time. Box 605, Pest Control magazine.

SYNTRON self-rotating hammer Model 26RO, 18 months old, perfect condition, with 7 bits. $125. Termite Proofing Service, Lakewood, N. J.

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PEST CONTROL BUSINESSES in Arizona, New Mexico, W. Texas, or San Diego. Truly Nolen, 3575 E. Speedway, Tucson, Arizona.

WILL BUY pest control business, California only. Will pay cash or any acceptable plan. Write Box 611, Pest Control magazine.

WILL BUY your surplus cyanide discoids from 25 lbs. up. Oser Exterminating Co. 1118 Stout St., Denver 4, Colo.

PEST CONTROL business within 100 miles of Chicago. Present management can be retained. Secured income based on complete or partial retirement and/or cash, stock, terms to suit. Box 601, Pest Control magazine.

STATEMENT OF OWNERSHIP

Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 and June 11, 1960 (74 Stat. 208) showing the ownership, management, and circulation of Pest Control, published monthly at Cleveland, Ohio, for October, 1961.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Trade Magazines, Incorporated, 1900 Euclid Avenue, Cleveland 15, Ohio; Editor, James A. Nelson, 1900 Euclid Avenue, Cleveland 15, Ohio; Managing editor and business manager, none

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.)

Trade Magazines, Incorporated, 1900 Euclid Avenue, Cleveland 15, Ohio; James A. Nelson, 1900 Euclid Avenue, Cleveland 15, Ohio.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bonafide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required by the act of June 11, 1960 to be included in all statements regardless of frequency of issue.) 5,633

JAMES A. NELSON, Publisher

Sworn to and subscribed before me this 3rd day of October, 1961.

ROBERT E. HAGAR, Notary Public
My commission expires October 3, 1964

Protopam Antidote Developed

Protopam chloride, a new chemical for treatment of poisoning from insecticides having anticholinesterase activity, is available to physicians for investigation from Campbell Pharmaceuticals, Inc.

PCOs who wish their company doctors to have further information about the new drug may direct inquiries to the company at 121 E. 24th St., New York 10, N. Y.

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Shell Registers Telodrin

Telodrin insecticide, a new weapon against soil insects, is now available in experimental quantities from the Agricultural Chemicals Division of Shell Chemical Company. It is described as a chlorinated hydrocarbon similar in action to aldrin, dieldrin, endrin and DDT.

U. S. Department of Agriculture recently approved shipment of limited amounts of Telodrin for field research by entomologists working with the government, with institutions, and with commercial formulators.

Available either as 1% and 2% granules or as an emulsible concentrate containing 1.2 pounds of insecticide per gallon, Telodrin is alleged to be effective for controlling forage-crop-destroying insects.

New Pumps for Drum Dispensing

New line of metal drum pumps suited for dispensing insecticides and other liquids from drums and barrels has been introduced by Baldwin Manufacturing Company, Toledo, Ohio.

Constructed of heavy gauge steel tubing, with chromeplate inside and nickelplate outside, the pumps are available in three capacities: 8, 4¾ combination, and 4 ounces. Each is adaptable to 15, 30 and 55-gallon drums.

Additional information and prices may be obtained from Baldwin Manufacturing Company, 1100 Custer Drive, Toledo 12, Ohio.

SBA Budget Booklet Issued

Six operating budgets to help increase profits are discussed in a new booklet, "Getting Results From Your Budget," recently issued by the Small Business Administration.

The leaflet, which is specially geared to the small firm, is available on request at SBA field offices.

Calif. PCO Jesse Miller Dies

Jesse M. Miller, pioneer fumigator and veteran California PCO, died recently at his home in Encino. He was 70.

Widely known in PCO circles, Mr. Miller and his son, Darrell, operated the J. M. Miller, Inc., firm in Encino.

Other survivors include his widow, Hilda; two additional sons, Orrin A., and Willard W.; two daughters, Mrs. Carol Daum, and Mrs. Afton Barnes; and 11 grandchildren.

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Pestales

Triple duty man. **Dr. Harlan Shuyler is tripling in service, sales, and research these days. Along with his father, Reynold, Harlan operates Conservation Industries in Kansas City, Kansas. Jim Prohaska is a key man in this PCO service operation, too, which the Shuyler's nickname NICE. Roland Rhodes and Harlan run Pest Control Supplies, a Kansas City area outlet for PCO chemicals and equipment. And, on the other side of the triangle, Harlan serves as a research counselor for several pesticide manufacturers plus heading up a serviceman training program for a group of operators in KC. Oh, yes, he's developed a new rodenticide which we'll be hearing about in the not too distant future. What does he do in his spare time? Well, he's a member of the NPCA Board of Directors, is active in his Presbyterian church, and finds time to travel some with his wife, Sedley, and their three boys.**

* * *

Apes Down in Cape Town. Life in suburbia is no less harrowing at Cape Town, South Africa. Here baboons have replaced crab grass in conversations at cocktail parties and on commuter trains. When residents on the slopes of Table Mountain outside the city were menaced by the long-armed Simians, city council ordered them caught with fruit-baited traps. So far, 50 have been enticed into wire cages through doors that immediately slam shut when the baboon picks up the fruit. Wonder if they sell them to zoos? What a sideline for some enterprising PCO!

* * *

Winner Gets Trip To Nassau. **During the 12 months which ended at the NPCA convention last month, the association staged a membership contest with prizes ranging from a free registration at the Miami Beach affair to an all-expense trip to Nassau. Most energetic, and productive, of all contestants was John J. Veatch, pest control chemicals sales manager at Wood Treating Chemicals Co. in St. Louis. John brought in 21 new members and thus basked and bathed in the Nassau sun and crystal clear waters at NPCA expense. After all that work, he deserved a vacation! Runners-up were Romeo Erdie of Ace Exterminators, Fairmont, W. Va.; Fred P. Wright, Wright Pest Control Co., Augusta, Ga.; and David E. Anderson of Evans Laboratories, Inc., Little Rock, Ark., each of whom came to the convention as guests of NPCA.**

* * *

X Marx the Spat. Attorneys for two warring Milwaukee suburbs want to take their rat problem to court. Seems an old farmhouse in Suburb A harbors a substantial rodent colony which at night invades homes in Suburb B. When trustees on Village Board A suggested a community rat poison pool, hasty vetoes rejected the notion. One inhabitant thought this would be socialism. Our answer? Call a PCO. Fight socialism, fight rats, save free enterprise!

* * *

Men on the go. **There are those who think being an NPCA staffer is duck soup. A recent Newsletter from the association's Elizabeth, N. J., headquarters should allay any idea that all Ralph Heal, Phil Spear, Bob Showalter, and Dick Moore have to do is sit at their desks answering mail from their members. In the next four months, the itinerary of these four men includes 21 scheduled trips to PCO conferences and meetings, not to mention routine jaunts to Washington and en route stop-overs at university and government experiment stations. It always amazes outsiders that members of this industry make up such a hard-working crew.**

* * *

Bye, Bye, Blackbirds. Down in Grayson County, Texas, large flocks of blackbirds are about half shot, literally and figuratively. It seems the local gendarmes were fed up with splotchy marble on the courthouse, auto finishes that look like inkblot tests, and the sheer impossibility of pedestrian traffic after dark, when the nocturnal visitors return from their day in the country. Men of action all, the constables armed themselves with sawed-off shotguns and lurked in the shadows until nightfall, when the birds settled down for a contented rest in trees planted around the village square. Then, surrounding a tree, the officers aimed simultaneously into the flock and fired at a pre-arranged signal. The treatment was so successful, they kept it up, and to date have dispatched some 3,000 of the ebony pests. A more determined posse never rode through the West!

New odor-masking agent for use in

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Formulations

Developed at the request of many Pest Control Operators, DIASCENT is an amazingly effective odor mask and freshener for finished formulations made with Diazinon. It is usable in oil or water-based products and its wonderful odor-covering power makes it extremely economical. One pound will actually odor-mask 64 gallons of finished formulation! *Why not order a trial pound for your own tests today.*

PRICE:

1 pound $3.20 • 5 pounds $2.95 per pound

AROMATIC PRODUCTS INC., 235 Fourth Avenue, New York 3

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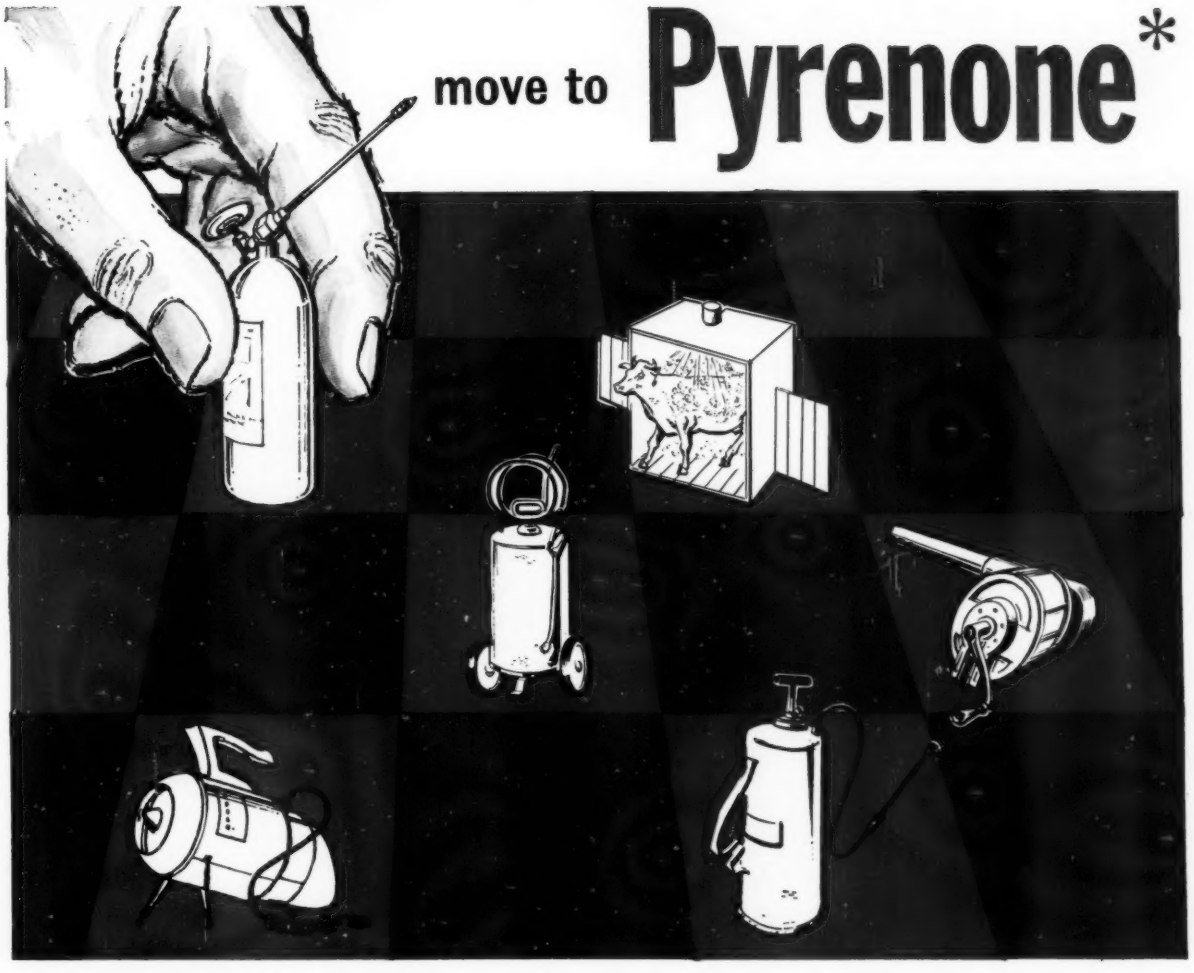

for Peak Performance in Residual Insecticides

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Known as Fairfield Pyrenone, this combination spells quality. It assures the farmer, PCO, sanitarian and plant maintenance man of peak performance—the fast knockdown and kill found only in superior products—plus unique safety.

And this is the action that counts in plant buildings, warehouses, eating places, food storage and food processing areas. It is essential in farm buildings . . . and to protect farm animals from insect attacks.

Pyrenone bases for addition to residual insecticides come in many forms, liquid and powder. Such residual formulations may be applied in a variety of ways, in equipment ranging from hand dusters and aerosols to power units and automatic sprayers. There's an economical, fast-acting Pyrenone formulation to meet or supplement every insect control requirement, to fit every application method—equipment large or small, simple or complex.

What makes Pyrenone unique is its ability to reinforce long-lasting but otherwise slow-acting residual chemicals. Pyrenone provides positive flushing action and knockdown—the vital, visible actions that build confidence . . . and sales! Contact your Fairfield man today for further information and literature on Fairfield Residual Concentrates or write direct to Fairfield headquarters.

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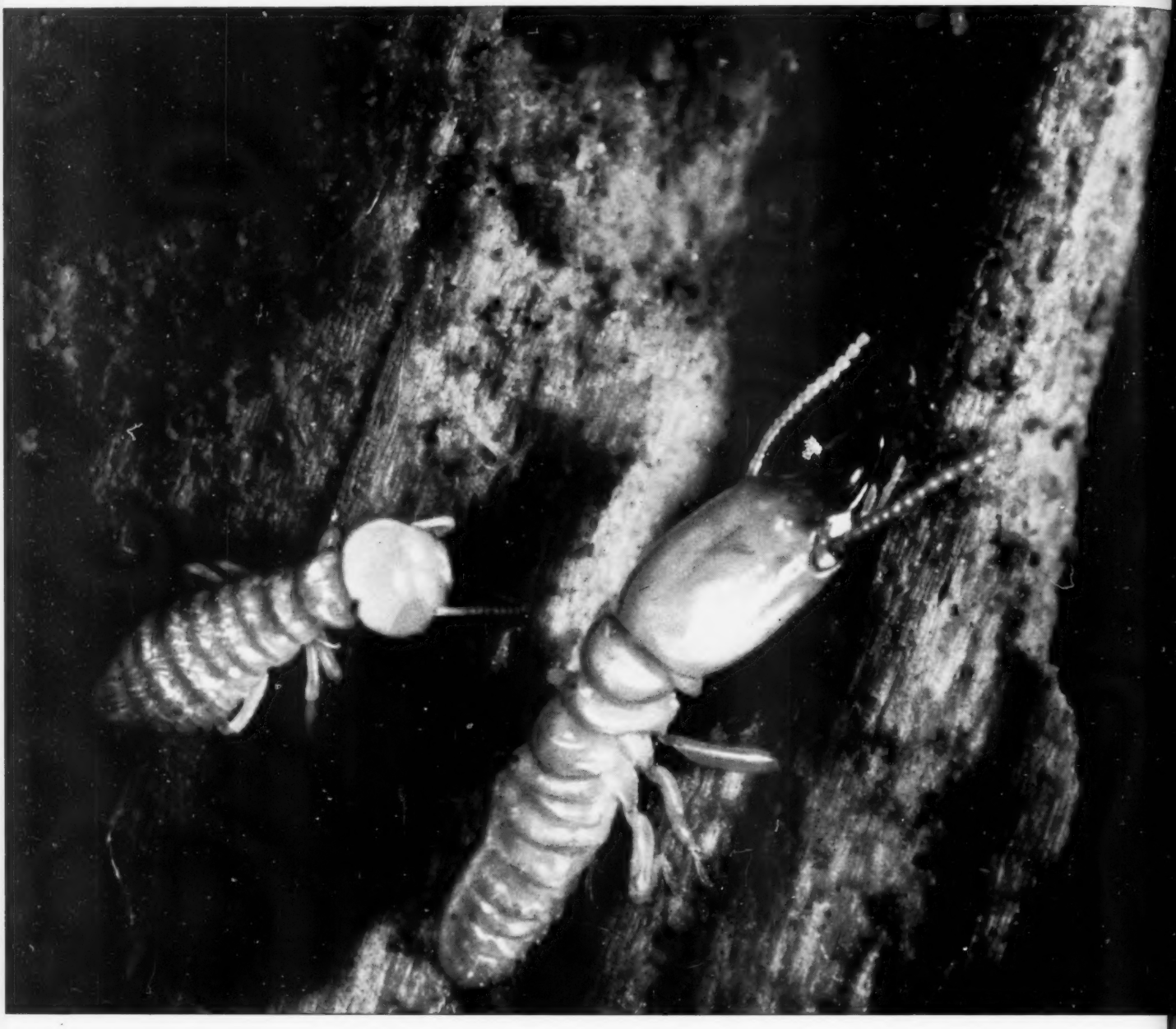

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—and there's no significant increase in building costs.

ALDRIN has proved to be one of the most effective termite controls in use today.

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Aldrin is listed in the minimum property standards of F.H.A. for termite control on all types of new construction—slab, basement and crawl space. The U. S. Forest Service, the Armed Forces and many other Federal, State and local agencies responsible for building construction have listed aldrin for use as a soil poison.

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